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Chang Chien.

CONSERVANCY WORK IN CHINA.

BEING

A SERIES OF DOCUMENTS AND REPORTS

BY

CHANG CHIEN,

President of the Provincial Assembly of Kiangsu, Chairman
of the Board of Directors of the Han-Yeh-Ping Company,
High Commissioner of Salt Administration of Liang-
Hwai, Vice-Chairman of the Kiangsu Railway
Company, Promotor of Educational and
Industrial Enterprises in South
Tungchow, etc.

SHANGHAI:
"THE NATIONAL REVIEW" OFFICE.
1912.

CONSERVANCY WORK IN CHINA.

A Series

OF

Documents relating to Conservancy in Kiangpei.

Prepared

BY

CHANG CHIEN.

SHANGHAI:
"THE NATIONAL REVIEW" OFFICE.
1912.

序

今之覘人國者必於其民之生內政修明民生樂利此大較也吾華東南急政不一而大要無逾於治淮二十年來沿淮告祲之歲都凡八九費官帑義振至千數百萬仍無以生沿淮數千百萬之民也冀民於生必先脫民於死治淮顧可緩哉下走江淮間人見聞尤習弱歲游淮因於足跡所至推尋河盛奪淮河徙弱淮之源流研究治標先本治本兼標之事理著爲私議呼號於政府迄歸無效僅託空言前淸本省諮議局成立開幕之始特提議案幸獲決行設立江淮水利公司於淸江浦并遣南通河海工科學生分班測繪成圖成蹟差著上年美赤十字會以友邦之誼屬工程師詹美生君勘淮檢閱各圖及規畫之法不爲所病惜詹君勘測但因前迹匆匆告竣不獲以新學理見餉深引爲憾夫淮之必當治治之必當有法此公言矣吾國治淮之議不自今始主其說者不一而於歸墟入海之議聚訟尤繁非通中外而策其宜必不能合古今而衷於善近世工程之學日益發明借鏡乃助稃形造車必斬合轍鄙人所擬辦法及前後議深願賢之世界付諸公同之討論設得專家以所經驗示我周行豈非大幸李治君英之文學家也嚴君飴庭夙習英文而又留心於政事者也二君不靳晨夕之勞慨爲任譯四海兄弟之義訢合於友朋世界慈善之施棣通於政治是編其爲之嚆矢已譯成用志數言亦於二君表弗諼之意云

中華民國元年十一月初一日南通張謇敘於滬次

PREFACE.

Today it is clearly recognized that no study of a country can be complete that does not enquire into the well-being of the people at large. We consider that country well governed in which not only does the machinery of Government work smoothly and effectively, but it so works as to conduce to the happiness and prosperity of the people. For this reason it is necessary to deal with such matters as the Hwai Conservancy. In the south-eastern half of China there are many matters that require the immediate attention of the authorities, and amongst them one of the most urgent is the subject that has given rise to the various papers herein collected. During the past twenty years famine has been reported eight or nine times in the Hwai region, and though millions of taels have been spent in giving Government relief and in the palliative efforts of the charitable, yet the large population in this district is still faced with a continuous serious struggle for a bare existence. Before attempting to afford a decent means of livelihood for these people something should be done to relieve them from the menace of death from preventable calamity. This being so, the conservancy of the Hwai River cannot possibly be longer delayed.

Being myself a native of the affected regions in the Province of Kiangsu I have had ample opportunity of a first hand acquaintance with the conditions that obtain there. As a young man I made it my business, whenever travelling, to study as carefully as possible the conditions, and to ascertain as far as was possible the relations between the Yellow River and the Hwai. As the result of my observations papers were prepared outlining the measures, both temperary and permanent, that were necessary to insure the removal of the causes that led to recurring distress. The publication of these studies led to strong appeals to the Government, but in vain.

PARFACE.

When the Provincial Assembly of Kiangsu was inaugurated under the old regime, a resolution was proposed and carried in that body by which a company known as the Kiang-Hwai Waterways Development Company (江淮水利公司) was formed with headquarters at Tsingkiangpu, and a number of the students of the Tungchow Normal College, with technical training in hydraulic engineering, surveying and cartography, were sent out in different groups to conduct a survey, and to make maps of the district. In this way no small success was achieved.

Last year the United States Red Cross Society in a most generous manner appointed an engineer, Mr. C. D. Jameson, to investigate the conditions in the Hwai region. To this gentleman the maps and plans prepared under the direction of the above Company, and the measures of amelioration then contemplated, were submitted; and it is gratifying to record that from this distinguished engineer they received no adverse criticism. It is a matter of extreme regret, however, that Mr. Jameson's investigations, conducted under pressure of time, added to what was already known nothing in the way of theory or discovery that would serve for our guidance.

It cannot be denied that the Hwai Conservancy work must be taken in hand and carried out on proper lines. The subject is not a new one; there have been many suggestions and discussions in the past as to the best plan of dealing with the engineering side of the problem. No satisfactory scheme can be evolved unless all the investigations, both the earlier and the later, Chinese and foreign, are thoroughly considered. Engineering Science daily becomes more accurate and complete, and if we are in this matter to achieve success we must follow the example set by others, our work being the reflection of theirs as in a mirror, and being designed for a definite end and purpose just as a cart is built to suit the track. It is my great desire to have the benefit of public criticism from all over the world on the papers prepared by myself on this subject and on the measures contemplated for carrying out the scheme, and we should esteem it great good fortune were we to receive the criticisms and advise of experts.

PREFACE.

The translation of this work has been done by Mr. Yen Ye-ting, a keen student of Political and Economic matters with a good knowledge of the English language. Mr. Yen has been assisted in some minor details by Mr. W. Sheldon Ridge. Hereby is illustrated the truth of the saying of Confucius that "All within the Four Seas are Brothers"; and herein is also exemplified the true union of philanthropic and political activity. This book being now complete it gives me the greatest pleasure to write these few lines in apprecition of the interest that these two gentlemen have displayed and of the work that they have done.

CHANG CHIEN.

Shanghai,
1st November, the First Year of the Republic of China.

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CONSERVANCY WORK IN CHINA.

I.—LIFE OF MR. CHANG CHIEN.

One of the most pressing of China's problems at the present time in this country is the great conservancy problem. There are vast districts throughout which there is ever present the possibility of floods on a huge scale, and all too often the possibility becomes actually realized, to the consequent sorrow and misery of thousands of China's hard-working, ever-toiling sons and daughters. During recent months considerable attention has been drawn to the necessity for dealing with these problems of conservancy by the press propaganda carried on in connexion with the work of the Central China Famine Relief Committee, and by the reports of Mr. Jameson, the engineer appointed by the United States Red Cross Society to survey the famine region of Kiangpei and North Anhwei. It is impossible to over-rate the excellence of the work carried on by these agencies, but the quite legitimate publicity given to their work has tended to the emphasis of a notion, long current and far from correct, that the Chinese themselves have done nothing for themselves in the way of conservancy. As a matter of fact, there are abundant evidences throughout the country that in hydrographic engineering the Chinese have in recent as well as in past times possessed considerable skill and expended no small energy, both on conservancy and on problems closely allied therewith. During the past few years one of the most prominent names in connexion with conservancy work in China has been that of Mr. Chang Chien, the famous Kiangsu Optimus, who has pursued definite and coherent conservancy schemes in connexion with the Hwai and other rivers, and in order that the general public may know something of these schemes we shall publish a series of papers prepared from authoritative data dealing with this work.

The moving spirit all through has been Mr. Chang Chien, and as his has recently become a much more familiar name amongst both foreigners and Chinese, on account of his having been President of the Kiangsu Assembly, and at a later date one of the most likely of the persons proposed for the post of Prime Minister, and at the present moment a proposed member of the Advisory Committee on Loans, we shall commence by giving a short sketch of his life.

Mr. Chang Chien was born in 1853, the son of farmers in the Tungchow district of Kiangsu, a district north of the Yangtze famous for its cotton. His parents were farmers on a large scale, and were well known for many miles round as promoters of benevolent institutions and dispensers of considerable generosity to those less fortunately placed than themselves. Mr. Chang's first education was received privately in his own home, and his early promise as a scholar was shewn long before he reached his sixteenth year, when he took his first degree in the literary examinations of the old order, the degree known as *hsiu tsai*. From that time to this he has taken the very greatest interest in national problems and in the welfare of his fellow-countrymen. In 1878-79 China sent troops to Korea to assist that unfortunate country to prevent invasion by the forces of Japan. Mr. Chang was appointed secretary to the army and took an active part in the military council. After the campaign he presented to the Government several memorials outlining the policy that he believed the Government should adopt for the protection of Korea and for the maintenance of the integrity of Manchuria, urging that the utmost vigilance should be exercised with regard to the activities of Japan. These memorials, however, were all pigeon-holed. Mr. Chang then renewed with great energy his literary studies and presented himself for the metropolitan examination, wherein he distinguished himself by securing the position of Optimus, a distinction which gave him a national reputation as a scholar.

He then became a chancellor of several academies in the provincial capitals.

Though the crises through which China was passing were serious, yet the Government did not see the advantage of taking Mr. Chang into the public services, and indeed he was himself somewhat averse from entering these services, feeling that he could better serve his people in other vocations, and he retired into private life. From the vantage point of an independent outside observer he offered many criticisms and suggestions to the Government, contained in a series of published memoranda on political affairs.

In 1898 came the Hundred Days of Reform, which Mr. Chang regarded as premature and too hasty. In 1900, came the Boxer outbreak, during which the bitterness was intense, and Mr. Chang exerted his utmost influence with the then viceroys of the Liang Kiang and the Liang Hu, T. E. Liu Kun-yih and Chang Chih-tung, to use their fullest powers to prevent the south-eastern provinces from joining in the fanatical moveement. He also prepared a paper entitled "A Level-headed Suggestion for Reform 變法平議" advocating a change in the form of government. This suggestion shared the fate of its predecessors; it was pigeonholed.

By this time Mr. Chang had entered industrial life and was exerting himself in the reform of education. He was starting cotton mills, oil mills, flour mills, a silk filature, mulberry plantations, iron works, wharf companies, fisheries, a steam navigation company, a salt refinery, a company for the development of waterways, and a land reclamation company. This last concern cultivated land over an area of 1,600 *chin.*

The capital for all these enterprises was easily forthcoming because of the integrity which was a well known and widely respected trait in Mr. Chang's character, and secured for him the confidence of the investing public. It was thus very largely due to Mr. Chang's initiative that China entered upon her present career of industrial development. On the educational side Mr. Chang devoted the whole of his yearly income to the founding and development of normal schools for students of both sexes, higher elementary schools, elementary schools, agricultural schools, commercial schools, schools of manual training and hand-work in the crafts, Normal school work in China was practically initiated by Mr. Chang. Of philanthropic work Mr. Chang has been responsible for no small amount. An orphanage has been founded at T'ungchow under his patronage, accommodating in its various branches no less than 1700 children.

State affairs have never lost their interest for him, and as the years have gone by, indeed, that interest has been intensified. He has prepared papers, delivered lectures, and memorialized the Government on such important subjects as Likin, Tariffs, Civil Service, Maritime Law, Salt Administration, Currency, Standard Weights and Measures, and other equally vital matters, and had only one in ten of his proposals been carried out by the Government the condition of the country today would have been much more satisfactory than it is. Mr. Chang has been at one time or another advisor to the Boards of Education, Agriculture, Industry and Commerce, Rites, and Revenue. He has always been willing to give his advice when it has been sought, but he has steadily persisted in declining to enter official life. Enjoying the confidence of the public he was unanimously elected Vice-President of the Kiangsu Railway, President of the Kiangsu Educational Association, and last year of the Central Education Society which met to discuss many important educational problems in Peking. He was earnest in his efforts to secure the adoption of a constitutional government, and the establishment of representative institutions.

Mr. Chang's attention was first directed to conservancy problems some twelve years ago, when he realized the permanent menace to prosperity that was involved in the Hwai River, with its deficiencies in the way of outlet, and he suggested to the Viceroy at Nanking the adoption of a complete conservancy scheme; but his suggestions did not receive due consideration. Finding that he could not obtain any adequate measure of official support he established in connexion with his normal school at T'ungchow two separate departments, one of surveying and cartography and the other of hydraulic engineering, and nearly fifty students were enrolled therein. In order to give the students practical experience a complete survey of the T'ungchow district was made, and a reliable map compiled from the data thus obtained. In 1910 it was decided to undertake a survey of the Hwai River, and in 1911 a party of over thirty students was set to work on this task. with the result that two hundred maps, sectional and general, have been made of the Hwai River basin. When Mr. C. D. Jameson, on behalf the United States Red Cross Society, began his survey he asked to see the maps that had been compiled by this student corps, and he not only expressed high praise of the work that had been done, but he borrowed some of the maps and made copies of them for bis own use and guidance. Both Mr. Jameson's work and that of Mr. Chang's students were interrupted by the Revolution, but when order was restored Mr. Jameson asked Mr. Chang for the loan of several of his students in order to enable him to complete his work expeditiously. This was done, and Mr. Jameson's special task is now completed. Mr. Chang's work still goes on, however, being completed and made more reliable by filling in details and by recording changes that take place from time to time through the action of the erratic Hwai River.

* * *

II.—GENERAL IDEAS.

As Mr. Chang Chien is really the spokesman of the few who take an intelligent interest in conservancy work in China it is worth while to record here some views expressed by him at a public meeting held in Shanghai under the auspices of the Central China Famine Relief Committee, and also his conceptions of what requires to be done as embodied in a memorial to the Throne, some time ago. Speaking at the public meeting be said:

In my youth I was greatly impressed with the lamentable account given by my parents of the hardships endured by the people and the miserable conditions in which nearly every family lived during the two great famines, the first in the 28th Year of Tao-kwang, as the result of inundations, and the other in the sixth year of Hsien-feng. My parents were fully convinced that river conservancy work was the principal thing needed to prevent the occurrence of those disastrous famines. My father interested himself in this sort of work over twenty years ago, and through his interest I was led to make a careful study of the whole question, at the age of twenty-two, whilst on a visit to Hwaian. I bought a number of books concerning the conservancy of rivers in general, and especially of the Hwai River; and regretting that the plans of the late Tseng Kwo-fan (known as Marquis Tseng) and Chou Chun-tang were not carried out I prepared a memorandum on the subject of the conservancy of the whole Hwai Ho system (復淮私議) In 1902 I presented to the then viceroy of the Liang Kiang a paper on the permanent and temporary measures necessary for the Hwai conservancy (導淮宜標本兼治議) In 1904 there occurred a famine and I drew up a memorial of eight sections on behalf of the Liang Kiang Viceroy, and this was eventually forwarded to the Throne. As the result of these representations nothing more was done than the establishment of a survey bureau. Had the whole scheme outlined in the memorial been carried out the recurrence of famine would have been largely prevented. In the year 1909, on the occasion of the inauguration of the Provincial Assembly of Kiangsu I proposed a resolution concerning the Hwai conservancy scheme, and urged that it was a matter of the greatest importance for the welfare of the province. As there was considerable doubt whether the Government would be willing to accord its sanction to a work so vast, and involving such enormous expense, it was proposed that the work be undertaken by a public company to be formed under the name of the Kiang-Hwai Waterways Development Company (江淮水利公司), and this company was duly formed with its head office at Tsingkiangpu, a chairman being elected and a staff organized to carry on the work. Under my direction a programme of work was laid out, the method of survey was decided upon, the area to be surveyed was determined, and fifty thousand dollars were allocated from the provincial treasury to meet the necessary expense. From forty to fifty students, with special training in surveying and hydraulic engineering, selected from the Normal School at T'ungchow, were set apart for the work, and they set out in properly constituted groups to conduct a survey. As the result of this survey there were compiled two hundred maps shewing general and sectional details of the river. The lines followed by Mr. Jameson, the engineer appointed by the United States Red Cross Society to enquire into the whole problem presented by the famine area, are those laid down by myself as the result of our survey, and the general scheme of the survey has also met with Mr. Jameson's approval, as indicated in a letter to me. This is what has been accomplished so far.

Looking at the matter from the geographical point of view it will be seen that four provinces are primarily concerned in this matter of the Hwai conservancy, namely Shantung, Honan, Anhwei and Kiungsu, and of these four the two last are the more closely concerned. Having taken the lead in the matter the province of Kiangsu decided that the surveying lines should commence from the main waterways of the river. In the province of Anhwei there are numerous tributaries of the river; in ancient times it was reckoned that there were seventy-two, and at the present time over twenty are separately named. In order to carry on the work ten further surveying parties are to be sent out, and the Governor of Anhwei has been approached with a view to securing an appropriation of ten thousand dollars ($10,000), half to be set aside as purchase money for the best instruments and for miscellaneous expenses, and the rest used for maintenance purposes. It is intended to establish an office in Linhwaikwan. The first instalment of $ 5,000 was duly received but the occurrence of the Revolution and consequent heavy demands on the local treasuries make it unlikely that the remaining five thousand dollars will be available just at present. Had it been possible to secure the sum of $5,000, or better still $10,000, at the present moment students with training and experience in survey work could be sent out to act as assistants, and an office could have been organized to continue progress in the work of surveying the more important areas. The ultimate result of such work would be incalculable. It is a matter for profound regret that this preventive work could not be carried out; and in default thereof the only method of dealing with the present situation is to offer famine relief in the form of work.

The general idea of the full plan would be as follows. The preliminary steps to be taken consist in determining at what point work should be commenced and in ascertaining the nature, direction and strength of the currents in the various streams of the basin. The area that it is expected would be left dry as the result of draining rivers and lakes should be carefully estimated, for such area must be reserved for exploitation and cultivation and the revenue derived therefrom used to meet interest and other charges on the loan. The problem is not a small one: it concerns four provinces, and is of such magnitude that it would probably take eight or ten years to carry out the whole scheme, raising the money, undertaking the preliminary steps, organizing and completing the whole work. Pending the completion of the whole plan, there arises the question, What is to be done to deal with famine? For famine is bound to recur so long as the conservancy work remains unfinished. If famine occurs relief must be given, but the giving of free relief will not only fail to produce good permanent results, but will actually do harm by encouraging habits of dependence and sapping the power of initiative and self-help. Hence relief in the form of rewarded work has been regarded as the best form of alleviation from the very beginning. In undertaking any work one of the first questions to be considered is whether the work thus undertaken will serve the double end of relieving present distress and forwarding the completion of the whole scheme of preventive conservancy. If one keeps these considerations in mind it becomes obvious that the preliminary surveys must be conducted in the worst parts of the famine region such as the Shü-yang (睢陽) Kwo-yang (渦陽) Fei Ho (肥河) Lo-tang Ho (六塘河) Hsian-wei Ho (薔薇河) Shu-yang (沭陽) Tao-yuen (桃源), Sutsien (宿遷) and the different tributaries near the Kweijin Ho, (歸仁河) to the south of the Hwang Ho (黃河). The work to be undertaken after preliminary surveys had been made would be dredging and draining in Hsuchow, Hwaian, and Haichow, in north Kiangsu; and in Fengyang, Yingchow and Szechow in north Anhwei, where drainage has been silted up; or it would be deepening and widening of the river mouths; such as Kwo-ko (渦口), Ying-ko (潁口) and Maihoko (洙河口), (all being channels leading into the Hwai); Anhoko (安河口) and

Piaohoko (漂河口) (both being channels for the Shü (沭) into the Hungtze Hu (洪澤湖); Changfuko (張福口) (being the channel for the Hwai into the Grand Canal) Chulopa (竹絡埧) Hsutangko (徐塘口) and Erhtaiko (all being channels for the Yi (沂) into the Central Grand Canal (中運河); Liulaochien (劉老澗) (being the point at which the Yi (沂), Sze (泗) and Grand Canal (運) flow into the Lotang Ho (六塘河); Chowchiako (周家口) (being the channel for the Yi into the Loma Lake (駱馬湖); Linghungko (臨洪口) (being the channel for the the Shu (沭) into the sea through the Hsianwei Ho); and Wuchanlunko, (五丈龍溝) being the channel for the south and north Lotang (六塘) into the Peichaoho (北潮河). Unless five to ten thousand dollars can be raised at once from Anhwei it will be impossible to make a start this winter, whilst the weather conditions are favourable. I make these suggestions sincerely hoping that I may have your advice on these matters."

III.—MR. CHANG CHIEN'S MEMORIAL.

Having an intimate bearing on the preceding chapter is Mr. Chang Chien's memorial on the temporary and permanent measures necessary for the conservancy of the Hwai River, which ran as follows:—

"It is commonly said that Kiangsu must be a wealthy province because it pays such a large amount in taxes; but it is matter for regret that this common belief does not in the least accord with the facts. The province is divided into two parts, namely, Kiangsu and Kiangnin. The taxation in Kiangsu, though it has several times been reduced, remains the heaviest in China, whilst in Kiangnin, and especially in Kiangpei, ordinary taxation is not heavy, but likin is much greater than in Kiangsu because this district was not the scene of the severe fighting during the last internal disturbance. The revenues of the two provincial treasuries being insufficient to carry out the various administrative departmental work, new and old, and the payment of the alloted portion of the Boxer indemnity, taxation has been imposed on houses, prepared opium, pawnshops and various commercial transactions and has been collected every year. The central Government receiving suggestions in the morning and making its plans in the evening, always looks to the province of Kiangsu to take the lead in carrying its schemes into effect. The result is that the people of Kiangsu are exhausting their strength by responding to the demands of officials, by maintaining and attending to their local affairs, and by giving help to other provinces in their hour of need. The means for doing these things is derived from the pockets of the people. Whilst the population increases the area under cultivation remains the same, so that the farmers, the artizans and the merchants do not progress; yet still the two provincial treasurers look to the proceeds of the taxes specified above as the only means of raising money. If this condition of things is allowed to continue the getting of a livelihood will become daily more and more difficult for the people, even if no great disaster befal them! As it is, however, the people are visited by one disaster after another, and the end no man can foretell.

At the present time famine is visiting Hsuchow, Hwaian, Haichow and Yangchow; Fengyang, Yingchow, Pochow, and Sutsien, all near neighbours of Hsuchow in the province of

Anhwei: and those towns in Honan and Shantung along the border of Hsuchow have also suffered. The number of famine sufferers from Hsuchow and Haichow, gathering together in Sing Ho, a district near Tsingkiangpu, has already reached 500,000. The number of famine sufferers in Nansuchow is 300,000, in addition to those who have taken refuge in Chinkiang and Yangchow. The high authorities, fearing that the famine-stricken people would cross the river and create disturbances in those places where there is no famine, and thereby put obstacles in the way of raising funds for relief purposes, have issued the strictest orders to the civil and military officials along the Yangtze to take every precaution against such possibilities. The intention is not one to be blamed; but why should the people of Hsuchow, Haichow, Hwaian and Yangchow be reduced to such conditions? What is past is past and cannot be mended, but should no plans for relief be devised and put into execution it might lamentably happen that the millions of sufferers by famine would break out in a revolt in the hope that by so doing they could secure food for at least a day more. Still more lamentable would it be were they to accept famine as an inevitable thing and be content to die of starvation without breaking out into revolt. The high authorities are surely busy devising means of relief. Needless to say, the financial resources of Kiangsu, after providing relief for Chinsan (金山) for Yunnan, for Kwangtung, for Hunan, for Kiangnin and Chingkiang, are exhausted, and it would be impossible at the present time to raise locally a fund of millions, or even thousands, of dollars. Even were it possible to raise the required money it would be almost impossible to arrange for the succour and maintenance of the famine-stricken people in the different centres at which thousands of sufferers would be gathered. It is said that the low lands in Hsuchow, Haichow Hwaian, Yangchow, Fengyang, Yingchow. Pochow and Sutsien, have not been sown with wheat at the proper season. A long time must elapse before any harvest can be reaped; and even then the area sown is very small. How then shall we face the calamity that must come if the excessive rains of this summer and autumn are repeated next year? Alas how?

It is necessary for the doctors to discuss the cause of the disease before administering the cure, else perhaps the patent may get only temporary relief, the real trouble being still present and ready to make its presence known when the palliative has ceased to have effect. And several such renewals of the attack of the disease might well result in the case becoming incurable. It is impossible that the high officials, responsible to the Government for the welfare of the people, should be indifferent to their destitution and misery.

I have the honour to lay before you the following statements concerning the cause of the famine in Hsuchow, Haichow, Hwaian, Yangchow, Fengyang, Yingchow, Pochow and Szechow, for your information. The Hwai River traverses Hsuchow, Haichow, Hwaian, Yangchow, Fengyany, Yingchow, Pochow, and Szechow. In accordance with the description in the classical book "Yukow" (禹 貢) the main original channel of the Hwai, started from the district of Tonpai (桐 柏 縣) in Honan, and passed through Yingchow, Fengyang, Suyi, and Szechow in Anhwei, and through Sing Ho, Antung, and Yuntekwan (雲 梯 關) in Kiangsu, and then on to the sea.

The Sze (泗) tributary, rising in the Sze-shui (泗 水) district, traverses Chufu (曲 阜) Tze-yang (滋 陽) Tsining (濟 寗) and Tsow-hsien (鄒 縣) through the two lakes of Nanyang (南 陽 湖) and Weishan (微 山 湖), and then turns southward, forming the Chungyuenho (中 運 河). At the mouth of the Sing Ho (淸 口) it joins the Hwai and the Yi (沂); and beginning from the district of Yishui (沂 水) it passes through Lang han (蘭 山) and Tancheng (郯 城) across the Loma Lake (駱 馬 湖) and southward, joining the Chungyuenho (中 運 河) and the Hwai. In the Sung (宋) dynasty, Tangchow (畳 州) was washed away, owing to the overflowing of its banks by the Yellow River, which then received the waters of the Hwai. In the Ming (明) dynasty, as the result of building a wall in Hwanglokan (黃 陵 岡) the channel of the Hwai was cut short by the Yellow River. From the time of the Ming dynasty until now Hwaian and Yangchow have suffered from inundations. The cause of the trouble has been the fact that the authorities responsible for conservancy work took no thought for the Hwai, but devoted their attention solely to the Yellow River. The mouth of the Hwai became choked with sand, brought down by the Yellow River, this sand raising the bed higher and higher and producing a corresponding shallowness in the stream; so that whenever there came down an unusual body of water overflow and flood were unavoidable.

Early in the reign of Hsien Feng, Tonghwahsian (銅 瓦 廂) was flooded owing to overflow of the Yellow River, and consequently the channels east of Langyang (蘭 陽) and Kaochen (考 城) were silted up. In the fifth year of Tungchih, Chingshuitang (淸 水 潭) was flooded, a clear proof of the danger arising from neglect of the conservancy of the Hwai river. Ting Hsien (丁 顯) of Shanyang (山 陽) in that year prepared a paper on the subject of restoring the Hwai to its old course, and subsequently prepared several articles on this particular question, outlining the benefits to be derived from such a course, and the dangers to be expected by refraining from it, in a very clear manner. At that time none of the authorities realized the value and importance of his suggestions except Chou Chun-tang (左宗棠) the then Viceroy of the Liang Kiang, who with his usual foresight determined to take up the matter of Hwai conservancy. In the ninth and tenth years of Kwang-hsu, Viceroy Chou personally conducted investigations, and the plans he drew up are on record. He instructed Hsu Shao-huang, (徐紹垣) at that time Deputy Salt Commissioner at Haichow, to raise nearly two million taels by increasing the salt taxes to meet expenses. Besides work on the Hwai River, the Viceroy intended to deepen the Chishan (赤山) and Chinhwai (秦淮) lakes. Owing, however, to the Viceroy's transfer to Fukien these schemes fell through. Viceroy Chou left Nanking twenty-six years ago, and since that time millions of people in Hsuchow, Haichow, Hwaian, and Yangchow, in the province of Kiangsu, and in Fengyang, Yingchow, Pochow and Szechow in Anhwei, have suffered hardship and loss, even of their lives.

There is an old saying that "A man with his forehead burnt is a guest of honour." Is this so or is it not? During the period between the inundation in Chingshuitang and the great calamity of this year there has been only one viceroy of the Liang Kiang who could be regarded as a real statesman, and that was Viceroy Chou Chun-tang, who realized the importance of the Hwai conservancy work and formed a plan for carrying it out. The general excuse that has been made has been that the people were unable to undertake so heavy a burden after the disturbances to which they had been subjected. The inundation in Chingshuitang occurred after the suppression of the Taipings, but before the suppression of the Muhammadan rising. Since these events the necessity for remedying measures has been all the greater, for in the country, as at Hwaian, Yangchow, Hsuchow and Haichow, and along the coast thousands of lives and millions of taels' worth of property have been lost, thereby rendering the country weaker and weaker, and the people poorer and poorer, so that it is difficult to face such great calamities as this which has come so suddenly upon us. The question is, Shall these millions be left without any relief; or shall they even be given only such relief as pauperizes them? It is to be hoped that the high authorities will adopt Ting's suggestion, namely, the restoration of the old course of the Hwai, the deepening of the Chungyuenho and the administration of relief in the form of work.

According to the statement drawn up by Ting, the bed of the former Yellow River is sixteen feet higher than that of the Chungyuenho (中 運 河) in the neighbourhood of Suchien, (宿 遷) and eleven feet higher than that of the Hungtze Hu (洪 澤 湖). The current, in the stretch of over four hundred and fifty *li* from Chentzeho (成 子 河) in the district of Taoyuen to Yuntekwan (雲 梯 關), runs very quickly. If conservancy work is to be undertaken, in the lower stretch of the old Yellow River, the mouth of the Tungma harbour (東 馬 港) in Yuntekwan should be widened, thus leading the current across the Little Yellow River (黃 河) into the Tachaoho (大 潮 河) towards the sea. If conservancy work is to be undertaken in the upper stretch of the old Yellow River, the first thing to do is to undertake deepening work in Yangchwang, (楊 莊) thus leading the Yi (沂) and Sze (泗) tributaries into their old channels.

An artificial channel 700 feet long, 100 feet wide and 20 to 30 feet deep should be cut at intervals of 10 *li*, and these channels should lead to reservoirs five feet deep, with a surface width of 60 feet where the channel enters them and of 120 feet at the other end. These reservoirs should have shelving sides so that the measurements of the bottom would be exactly half those of the surface. By the strong current of the Yi (沂) and Sze (泗) tributaries the silt will be forcibly driven off. The next step would be to build reservoirs at the mouth of the Changfu Ho (張 福 河) thus leading the water of the Hungtze lake to flow from Chipao (七 堡) and Shunchin (順 淸) down to the Old Yellow River to meet the current of the Chih and Sze tributaries. Along the Changfuho, at intervals of 5 *li*, should be cut channels 600 feet long, 240 feet wide, and 16 to 18 feet deep, with reservoirs 80 feet in width at the surface, 40 feet at the bottom and with a depth that shall make the bottom 5 feet below the original bottom line.

The reason for this depth of 5 feet is that the bed of the Hungtze Hu is five feet higher than that of the Central Grand Canal (中 運 河). The work of repairing the embankments in Yu-Yih (盱 眙) (Anhwei), removing the bar in the Chentze Ho, (成 子 河) strengthening the outer embankments, cutting off the entrances to the Shan Ho, (三 河) and Linlaochien (劉 老 澗) widening the mouth of the Chin Ho (淸 河) and deepening the Hwai, if taken up and carried through without interruption, would take five years to accomplish; and involve an expenditure of Tls. 1,460,000.

It is now forty years since the publication of these memoranda by Mr. Ting, and since then not only have the bed of the Old Yellow River, and the beds of the Hungtze (洪 澤) Weishan (微 山), and Chaoyang (昭 楊) Lakes been much silted, but the Lo-ma (駱 馬) and Hsu-han (碩 項) lakes have dried up to such an extent that they have become almost cultivable lands. There are thus no sufficient outlets for the water, and great floods, with considerable destruction of property and loss of life, must naturally follow any heavy rain. If it is intended to take a complete view of the matter, so that permanent effective measures may be taken, it will be necessary to conduct a general survey in Hsuchow, Haichow, Hwaian, and Yangchow in Kiangsu; in Fengyang, Yingchow, Pochow, and Szechow in Anhwei; and also of the basins of the Old Yellow River and the Hwai River, of the Hungtze, Weishan and Chaoyang Lakes, of the depth and width of the mouths of the Chin Ho (清河) and Makiang (馬港); to collect data, from accurate observation, of the speed and force of the currents, of the annual rainfall and its distribution through the year, and other similar details. All this information should be recorded on properly constructed maps and charts. All this involves expense, and the question of expense is a difficult one. The best thing to do would be to raise the whole sum necessary, before actually commencing work; but that cannot be done, and would, even if adopted, militate against the giving of relief to the poor people in the form of work.

Keeping in view this policy of relief in the form of work, there are many possible courses. One suggestion is that the famine sufferers are to be engaged on the earth-works of the railway; but this is impracticable, as much of the work could not be attempted until a complete survey had been made, which means that the earliest time at which a beginning could be made would be after the Chinese New Year. Another suggestion is that foreign money be borrowed for the commencement of relief to be given to those working on earthworks. This is like quenching thirst by drinking poison, and the suggestion cannot be entertained. The only feasible plan is to adopt the suggestions of Mr. Ting, namely, to restore the old course of the Hwai; and to follow this up by adopting the plan suggested by the late Chou Chun-tang, of undertaking conservancy work along the Old Yellow River, starting from Yangchwang (楊莊) and going through Tsaochow (曹州) and Tangchow (單州) in Shantung; and Hsuchow and Pichow (邳州) in Kiangsi. From Hanchwang (韓莊) in the Tenghsien (滕縣) district of Shantung, to Sutsien in Kiangsu, the river is dried up for over 100 *li*, and thus the calamity of this year has had an effect upon such places as Hsuchow, Haichow, Hwaian, Tsaochow, Tangchow and Tenghsien, along the Old Yellow River, as well as upon the such places as Fengyang, Yingchow, Puchow, Szechow and Chenchow 陳州) (Honan) along the Hwai River. If the claims of) the inhabitants along the Hwai River are to be considered so ought also the claims of the people living along the Old Yellow River to be considered.

It is generally admitted that the people of Hsuchow, Haichow, Fengyang and Yingchow are by nature warlike, and averse from discipline. It is also admitted that millions of famine-stricken people are more easily managed when scattered than when concentrated. As a temporary expedient the officials and the gentry should co-operate in making an investigation into the distribution of the famine stricken people, many of whom are at this time concentrated in great groups, and in sending them back to their homes under military protection; and when these people have returned to their homes the able-bodied amongst them should be enlisted to undertake the work of river deepening, with the tools supplied to them, under military supervision, and at a rate of pay slightly higher than the ordinary, in order that the aged of both sexes, and the women and the children may be relieved. In addition to this, local work should be carried out in accordance with Mr. Ting's scheme, namely, the excavation of reservoirs connected with the streams by artificial channels. The village elders should be appointed to take charge of this work under the guidance and control of the officials and gentry. In this way the great groups of famine refugees would be broken up and thus more easily controlled, whilst the work would be so divided as to be carried out with comparative ease. To supplement these measures, grains, potatoes, and other food should be bought and taken to the famine districts, there to be sold at cost price, in order to prevent any scarcity of food stuffs.

Taking Mr. Ting's estimate, made forty years ago, as a basis, we may reckon that the local works will require an expenditure of Tls. 2,000,000. Roughly estimating the number of famine sufferers at 1,000,000, at two cents per head per day, a sum of Tls. 3,600,000 would be necessary in order to meet the expense of a period of four months' work. From this it is seen that Tls. 2,000,000 is not quite two-thirds of the total amount required, but even this sum would alleviate the sufferings of many and would save those on the verge of starvation. As this is a matter of national concern it demands the attention of the authorities. There will be a direct return from the relief given in the form of work accomplished, and this being so there should be no hesitation in using Government funds if it is found impossible to raise the necessary funds elsewhere. There is indeed a precedent for this, created by the Viceroy of the Liang Kwang and the Governor of Kwangsi, who made appropriations from Government funds for famine relief work.

Affairs in Kwangsi were, however, nothing like so bad as those with which we are confronted in Hsuchow, Haichow, Hwaian and Yangchow; and the work of restoring the Hwai to its original channel and of deepening the Old Yellow River would not only relieve present distress but prove a permanent benefit to the whole region.

Originally the Hungtze. Kaopao (高寶) Peima (白馬) Pisha (甓社) Chih-Kuan (汜光) and Shaopei (邵伯) Lakes were nothing more than a large tract of land. Since the Yellow River has changed its course the Hungtze has become a receiving basin for the waters of the Hwai River, and consequently there were left no farm lands for cultivation. Similarly, since the Hungtze has risen and overflowed towards the south the other lakes have altered their position and have further reduced the area available for cultivation. The farm lands in the districts of Kaoyu (高郵) Paoyin (寶應) Kiangtu (江都) and Taihsing (泰興) were all destroyed by the overflow of water from the dikes, and those in Haichow, Kanyu, Shuyang and Antung, along the Hwai River, are also in danger of a like calamity. If the Hwai River be restored to its original course, and the mouth of the Sing Ho be widened, thus affording a greater outlet for the waters of the Hungtze Hu, the lakes to the south of the Hungtze Hu will return to their former position, with largely reduced area, thus restoring for purposes of cultivation considerable tracts of land now nothing better than marsh. Moreover, the embankments in the districts of Kaoyiu, Paoyin, Kiangtu and Taihsing would then no longer be in danger of being flooded, and the low lying areas in the districts of Haichow (海州) Kanyu (贛榆) Shuyang (沭陽) and Antung (安東) would be supplied with drainage channels quite adequate to their needs. The result would be that the higher reaches of the Hwai river (the districts of Fengyang, Yingchow, Suyi and Szechow) would all be free from danger of inundation; and so too would Hsuchow, Peichow, Taoyuan, and Sutsien. This would all be a permanent benefit.

According to Mr. Ting's project there were only about 40 or 50 *li* of the Old Yellow River the bed of which was 11 feet higher than that of the Hungtze Hu. In the remainder of its course it varied greatly, some places being 7 to 8 feet, and others only 1 to 2 feet higher than the Hungtze Hu. At that time the lake was only about 5 feet deep, in spring and winter. Forty years having elapsed since these measurements they do not now hold good, the bed of the Old Yellow River and that of the Hungtze Hu having both been raised so that at ordinary times the deeper part of the Hungtze Hu is about 10 feet, and the shallower part is only about 1 foot deep. A rough estimate shews that 3,400,000 *mow* of land may be reclaimed from the Hungtze, Kaopao, Peima, Pisha, Chihkuan and Shaopei Lakes, and in the Tienchang (天長), Yuyi (盱眙), and other districts along the Hungtze.

A part of this area must be set aside for the expansion of waterways, and as land not immediately available for cultivation, but there still remain 3,120,000 *mow*. According to the new ordinance the price per *mow* is fixed at Tls. 32, and thus close upon a million taels would be raised for the national revenue from the sale of this land. The work of constructing embankments is to be left to the people, and when this work is completed the value of each *mow* would be at least five dollars. Thus the people would add to their own wealth a sum of fifteen million dollars. Under this scheme the relief given would bring both immediate returns and permanent benefit. On the other hand, if the authorities responsible for the present appalling situation still hesitate to adopt some such plan as is here outlined the millions of starving people will be sure to break out into rebellion, possibly joining with those now in revolt in Hupeh and the upper Yangtze. It would of course be easy enough to hinder the starving from creating a disturbance but even that would involve heavy military expenditure. The Government certainly does not maintain its army for the purpose of suppressing risings amongst its own starving people. Were the Throne to take a genuine interest in the welfare of the people and the authorities to realize the gravity of the situation, this sort of thing would be impossible.

IV.—REMARKS ON FOREGOING MEMORIAL.

Whilst travelling in Hwaian in the thirteenth year of Tung-chih, I had the opportunity of reading the paper prepared by Mr. Ting, and his views met with my unqualified approval. For over thirty years his plans have engaged my attention. My own scheme for the dredging of the Old Yellow River is based on observations made whilst I was living in Hsuchow in the twenty-first year of Kwang-hsu. Since writing the foregoing memorial I have read the full record of the attempt to restore the Hwai to its former bed. This record covers a period of five years, namely, from the sixth to the tenth year of Tung-chih. Mr. Ting's proposal was made in the fifth year of Tung-chih, and in the spring of the following year representations were made by the gentry of Hwaian, headed by Mr. Pei Yin-shen to the then Viceroy of the Liang Kiang, Tseng Kwo-fan, who sanctioned the gradual undertaking of the work. In the autumn of the same year Viceroy Tseng memorialized the Throne, and the Boards concerned were instructed to make reports on the matter, and eventually Imperial approval was obtained for the proposals. In the seventh year of Tung-chih the Viceroy sent deputies to make investigations over the various sections in turn, and a report, accompanied by explanatory maps, was prepared by Lin Hsien then taotai of the Hwaian and Yangchow Circuit. The scheme had to be given up owing to the transfer of the Viceroy to Chili. In the eighth year of Tung-chih the gentry of Hwaian, with Tsai Chu-yuen as chief representative, appealed to the Board of Censors in Peking to memorialize the Throne on their behalf. In response to this appeal the Throne referred the matter to the then Viceroy of the Liang Kiang, Ma Hsin-yih the High Commissioner of Grain Transport, Chang Chih-wan stationed at Tsingkiangpu, and the Governor of Soochow, Ting Jih-chan who were unaminously of opinion that it would be exceedingly difficult to raise funds for such a big scheme, and a report to that effect was presented to the Throne. The decision that had been reached by the Board concerned was that the channel of the Yellow River be diverted to the south, but on receipt of the report from the provincial authorities named above the Throne again directed the Board to give a further opinion on the matter.

Thinking that the Hwai conservancy work was a first step in the scheme of changing the direction of the Yellow River southwards, the Board requested the Throne to order the high provincial authorities to undertake the task. In the ninth year of Tung-chih, Tseng was once more appointed Viceroy of the Liang Kiang, and Tsai Chu-yuen and others again made representations and were assured that steps would be taken gradually, owing to the difficulty of raising money.

The foregoing facts are upon official record, and from them it is clear that though Tseng had a plan he had no funds, whilst Chou raised the money but had no plans. Both officials realized that the matter was one that needed to be taken in hand. The proposal of the Board to divert the Yellow River and at the same time devote attention to the Hwai conservancy was made in view of the transport of tribute grain for the Imperial granaries. As this transport has since been abolished there would appear to be no reason for changing the direction of the Yellow River, and thus causing complications with the Hwai river. Some may say that in view of the present difficulties and the poverty of the people the scheme is impracticable. As however these very difficulties and poverty have rendered the people incapable of bearing their hardships any longer, and have caused the Throne grave anxiety, it is to be hoped that the high authorities will pay heed to the suggestions contained in the foregoing memorial and submitted for their consideration.

Thirty years ago the word 'poverty' was constantly in the mouths of the provincial authorities. It is matter for speculation how much, during the intervening years, has been spent, without producing any return, by the high, and how much has consequently been lost by the low. The younger generation of those good families whose patrimony had been impoverished by successive inundations, realizing the folly of being content with the condition to which they had been reduced, borrowed money and went into trade, and perhaps after ten years or so recovered their losses. Others, not having experience of trade, were gradually reduced to starvation. Others, again, seeing that trade was not prospering, considered it easier to drift along without entering into trade. It is matter for regret that whilst all have recognized the unsatisfactory condition of trade, few seem to have realized that this condition was due not to trade itself but to circumstances beyond and outside trade as such. It is as if a man, seeing his friend suffering badly from indigestion, should decide to eat no food. What to do under these circumstances it is difficult to say.

V.—SPEECH ON CONSERVANCY, BEFORE THE KIANGSU ASSEMBLY.

At the inauguration of the Provincial Assembly of Kiangsu the President of the Assembly, Mr. Chang Chien, delivered a speech on the functions of the Assembly in which he devoted considerable attention to the question of the development of waterways as a means of raising revenue for the purposes of the Assembly. He spoke in part as follows:—

As a preparation for the establishment of Constitutional Government and for the opening of Parliament, Provincial Assemblies have been inaugurated. It is one of the duties of the Provincial Assemblies to report on possible developments of natural resources, and on necessary reforms, and the Assembly has the right to expect support from the Central Government on these matters. Today we inaugurate the Provincial Assemblies of Kiangsu, and no sensible person but hopes that the establishment of the Assembly will lead to the increased welfare of the province. For the development of natural resources funds are necessary, and representative institutions should not mean mere idle talk. In the expression of political opinion there must be complete liberty. The development of natural resources and the institution of reforms must be the very basis of the work of the Assembly. Hence the matter on which I now speak to you should be the first item on our programme. And what is that item? It is the problem of famine, which has broken out in Hsuchow and Haichow, by which millions of people have been rendered homeless, in spite of the millions of taels that have been spent.

In the 23rd and 24th year of Kwang-hsu there occurred famines in the same district, just as have happened this year. In the 32nd year the same thing occurred and, when plans of relief were being considered, I ventured to offer a few suggestions as to the causes of the famine and a method of relieving it. In those suggestions emphasis was laid on the policy of offering relief only in return for work done. The then Viceroy presented my suggestions in a memorial to the Throne, and a survey office was established. However, many obstacles were placed in the way of carrying out the scheme, by interested parties, and my great hope of doing something to ameliorate the conditions proved vain. Had there been any decisive action taken at that time there would not have been any famine this year or at any rate its severity would have been greatly diminished. It is no use, however, to wail over the past. Today no native of Kiangsu, with anything of a conscience, is prepared to allow the causes of famine to remain as they have been and to be a menace to the wellbeing of the people. The frequent recurrence of famine, following on floods, is due to three causes: first, the change in the direction of the Yellow River; second, the shallowing of the Hungtze Hu on account of the overflow of the Yellow River in the neighbourhood of Chenchow; third, the silting of the Grand Canal, as the result of neglect since the grain for the Imperial granaries has been sent by sea instead of by the Canal. The change of direction of the Yellow River has considerably reduced the amount of outflow to the sea, and the silting of the Hungtze Hu and the Grand Canal have reduced the reservoir capacity of those waterways. Every time that a flood takes place the Grand Canal and the Hungtze Hu become more silted, and this in turn increases the probability of flood and consequent famine. These things are perfectly natural. In the 32nd year of Kwang-hsu over Tls. 6,000,000 were spent in famine relief, and this year at least two or three million taels are required to cope with the situation. These sums represent a dead loss to the Government. Millions of *mow* in north Kiangsu have been destroyed by floods and if the price of each *mow* be reckoned at a nominal $3.00 the pecuniary loss to the people is seen to be enormous. In China, statistics are never issued in connexion with these matters, and consequently the great losses suffered by the Government and by the people are not fully realized and do not attract public attention. Should no steps be taken to deepen the channels of the Hwai, the Yi and the Sze, there will be further floods in north Kiangsu, and it is to be feared that north Anhwei and south Kiangsu will also be affected. The vastness of the work makes the undertaking a difficult one, and the straitened condition of public finance adds to the difficulty. The general public, too, does not fully understand the nature of the work, and it is therefore almost useless to collect subscriptions. Repeated and careful consideration of the problem leads to the conclusion that the only method of procedure is to establish a joint stock company to be known as the Kiangsu Waterways Development Company under the auspices of the members of this Assembly. As north Anhwei has also suffered from inundations it is possible and desirable that cooperation with the Anwhei people should be sought.

The first thing to be done is to undertake a survey of the affected district. This survey should determine the levels of the various waterways, compared with sea-level, at all the places subject to inundation, and the data thus collected should be made the basis of a comprehensive scheme of drainage. The work of deepening and widening the various waterways and lakes should be determined by the required reservoir capacity and by the distributing capacity of the various channels. Those responsible for the surveys should be carefully chosen expert surveyors, and accompanying these surveyors should be students undergoing training in surveying and hydraulic engineering. For the immediate future the work should be supervised by Dutch or other foreign experts.

When the surveys are completed and the probable cost of the whole scheme has been estimated the share capital of the Development Company could be decided upon. It would be necessary to undertake the work gradually, and those interested might induce public-spirited men to assist the undertaking by taking up shares. The reclaimed land would be set aside for cultivation and the profits of this cultivation would be used to pay dividends on the subscribed capital. As the members of this Assembly receive allowances and remuneration for their work they would be expected to undertake the direction of this public improvement without further emolument. The necessary initial outlay for the payment of experts and for their travelling expenses would be met by a society consisting of the whole membership of the Assembly, and known under the name of the Waterways Development Auxiliary Society. When the preliminary work has been completed steps may then be taken for the issue of shares and the commencement of actual conservancy operations.

The lakes having been deepened in order to provide greater storage capacity for the water, and the rivers having been widened in order to offer adequate outlets for excess water, it will then be necessary to protect the reclaimed land by constructing embankments. In this way millions of *mow* of land would be restored to profitable purposes.

At the commencement of the preliminary work the boundaries of the three provinces of Shantung, Anhwei, and Kiangsu should be clearly defined.

The reclaimed land should be registered according to Government regulations, and be put into cultivation. The royalty derived from the leasing of this reclaimed land should be divided into ten parts, six of which would go as dividends to the shareholders, one as bonus to the staff, one and a half as a contribution to the funds of the local authority, and the remaining one and a half as contribution to the funds of the Provincial Assembly. The funds thus accruing to the Assembly should be devoted to the development of the resources of the whole province. Should the support of the whole Assembly and the patronage of the officials be secured, industry, education, famine relief, and public works, all of which are amongst the functions of the local Government, would be beneficially affected. Public bodies are excellent institutions and of these the Provincial Assembly is one of the most important. There is a great difference between a public body organized to deal in a practical way with matters that concern the welfare of the people and a body organized merely for doctrinaire discussion. I beg you to ask yourselves which of these bodies more deserves your sympathy and has the stronger claim upon your support.

The papers prepared by myself sometime ago and entitled "Suggestions for Conservancy Work along the Hwai River" and the "Memorandum and Articles of Association of the Hwai Conservancy Company," together with maps that have been already compiled and are now being printed, will be distributed in a few days.

Having thus sought to enlist your co-operation I beg to submit to you the following reasoned resolutions:—

NAME OF THE COMPANY.

There is nothing in the world which produces unmixed benefit or unmixed evil, and even harmful things properly controlled may be made to produce good, whilst good things left without control, or wrongly used, may result in evil. There is nothing to which this principle is more truly applicable than to natural supplies of water. Of the rivers of China it is commonly considered that the Hwai River comes next to the Yellow River in capacity for doing harm. Since the Yellow River has changed its course the waters of the Yi and Sze distribute themselves in two directions, namely, to the Yangtze and to the Hwai, and consequently Hwaian and Yangchow receive more harm than profit from these sources. Since the Yellow River has taken its turn to the north the old course of the Hwai River has been gradually drying up, and those lakes and rivers which formerly served as reservoirs have silted and ceased to act in that capacity. The Hwai River, being unable to receive the waters of the Yi and the Sze, at times of overflow, Hsuchow and Haichow are also affected. For these reasons the conservancy of the Hwai River should be taken in hand simultaneously with that of the Yi and Sze, but the conservancy of the reservoir lakes and the distributaries therefrom should be taken up before that of the Hwai. When the conservancy of the lakes and rivers has been completed the immediate benefit will be felt by Hsuchow, Haichow, Hwaian, and Yangchow; and when the conservancy of the Hwai river has been effected Yingchow, Fengyang, Yichow, and Tsaochow will participate in similar benefits. The benefit ensured will be general. Keeping these points in view *it is* *resolved that the name of the company be the Kiang-Hwai Waterways Development Company.*

RESPONSIBILITY.

Since the 23rd and 24th year of Kwang-hsu, famine has occurred four times. The supreme authorities, the viceroys and governors, have been hoodwinked alternately by stupid and incapable subordinates, neglectful of their duty, and by still more reprehensible subordinates acting corruptly in order to fill their own pockets. It is obvious that in conservancy work and also in relief of famine there are opportunities for "squeeze". The causes of famine not being removed, relief becomes necessary, and famine relief, often distributed at points away in the country where close supervision of the actual distribution is difficult, offers great opportunities for illegitimate profits. When there is danger of famine arising from floods the instructions of the authorities are that the dikes shall be opened, and immediately famine breaks out, people begin to talk about relief. So long as relief is being administered the officials are anxious, but once the crisis is passed the whole thing is forgotten. From the official point of view they are to be blamed though really the fault is not theirs. We who have lived in this famine-stricken district and seen it visited by calamity four times in twelve years can scarcely blame the officials, who are here today and gone to-morrow like residents in a boarding house. Now, however, the Provincial Assembly is established, and the people are instructed by the Throne to develop the resources of the province ~~and~~ to remove the cause of these calamities. Without the close co-operation of the whole province the work cannot be undertaken, and if the Assembly will not undertake this responsibility there is no other body that can do so. Keeping these things in mind, *it is resolved that the Provincial Assembly of Kiangsu holds itself responsible for the Kiang-Hwai Waterways Development Company.*

PROGRAMME.

The first step in the proceeding is to investigate the cause of the evil, and to observe the exact nature of its effects. The development of waterways in Kiangsu would have an effect upon millions of *mow* of land. If the work is undertaken without a proper survey we shall be attempting to remove an evil without knowing anything of its cause, and though such a method might fortunately be effective over a small area and in a temporary way it cannot have any permanent practical value. Incomplete schemes will not only result in great waste of money but will actually place obstacles in the way of a complete scheme, especially if they be entered upon without adequate preparation. For these reasons, *it is resolved that the work shall be commenced with a survey.*

CO-OPERATION.

Kiangsu and Anhwei have both been sufferers from the calamities that have arisen from the neglect of the Hwai Conservancy, and they will similarly share the benefits that will be derived from the effective completion of a satisfactory conservancy scheme. The sources of the Yi and Sze are in the upper parts of Hsuchow and Haichow. The calamity of flood and famine falls particularly upon Kiangsu and not upon Shantung. But the profit that will accrue from the reclamation of land around the Weishan Lake will be shared by Shantung. It will not be easy to secure support for the undertaking from those who, though they will share in the benefits to be derived from the scheme, have not in the past suffered the calamity common in other districts. Kiangsu itself must therefore conduct a survey in Shantung, and when this survey has been completed the boundary between Kiangsu and Shantung should be clearly defined in order to prevent future disputes. Anhwei, however, has in the past had its share with Kiangsu of flood and famine, and will in future participate in the benefits that we are anticipating. Both Kiangsu and Anhwei have a close interest in the Hungtze Hu. We may almost take it for granted, therefore, that the Anhwei people will be glad to support us in this matter. For these reasons, *it is resolved that the Waterways Development Auxiliary Society shall be organized first and that its membership shall not be limited to the people of Kiangsu.*

ORDER OF PROGRESS.

Before the commencement of the work it will be necessary to make representation to the officials for purposes of record, to establish a surveying bureau, to make estimates of the cost of the work, and to get public-spirited men to take up shares. Next must be considered whether the work is to be carried out by hand labour or by machinery, and whether it is to be planned according to areas or according to sections. There are thousands of details into which full enquiry must be made. It is impossible for the members of this Assembly to carry out all these investigations within the short period of their session. The only practicable plan is to hold the resident members of the Assembly responsible for making progress within the limits of what has been definitely authorized to be done. As a legislative body the resident members are in a condition to watch the movement of the Company and to make a monthly report thereon to the Assembly. Unless this is done our conference will have ended in idle talk. *It is therefore resolved, that the resident members of the Provincial Assembly be authorized to carry on the work step by step until some definite result has been achieved.*

APPORTIONMENT OF PROFITS.

In ordinary companies operations are commenced with the issue of shares, but in the case of the Kiang-Hwai Waterways Development Company many preliminary matters have to be undertaken and only when these preliminary proceedings have been brought to a termination can the Company itself be formed on a sound basis. As a legislative body the Assembly has no right to engage in trade, but on the other hand it can scarcely be expected, in a matter of this kind, to perform all its services voluntarily. Since the resources of the Assembly will be utilized in securing the desired benefits it is but reasonable that the Assembly should share in the profit in order that the proceeds may be devoted to the development of the resources of the whole province, a matter in which the Assembly is very largely interested. *It is therefore resolved, that the Kiang-Hwai Waterways Development Company shall set aside three-tenths of its profits for the Assembly to use at its discretion in the development of the provincial resources, and in rendering financial assistance* to *those places that have co-operated with the Company in its work;* and it is further resolved, *that the Company shall have the right to be fully informed of the purposes to which the money so contributed to the Provincial Assembly shall be put; but the Company shall have no right to refuse or to reduce the apportionment of the said share of its profits to the Provincial Assembly.*

In conclusion, it may be pointed out that the idea in organizing this Company is to remove all menace to the welfare of North Kiangsu, and in carrying out the survey attention will not be confined to the Hwai River. During the session of the Assembly many speeches were made on this subject, but this speech by Mr. Chang Chien, together with his resolutions, was adopted unanimously to be placed on the minutes of the proceedings.

* * *

VI.—KIANG-HWAI WATERWAYS DEVELOPMENT COMPANY.

In view of the fact that during the last ten years floods and famine resulting in heavy loss of life and necessitating the expenditure of over a million dollars have occurred it is essential that measures be taken to prevent further loss and damage. So long as conservancy work is neglected floods and famine will recur and it is therefore decided to form a company to be known as the Kiang-Hwai Waterways Development Company. The first work of the Company will be to conduct a survey and for this the following general arrangements have been decided upon:—

(A).—LINES OF SURVEY.

(1) *Yingchow* (穎州). The Hwai River is to be regarded as the main line of survey. This river has its sources in Honan, but it begins to exercise its great power in Yingchow, and therefore this is the point at which survey work would begin. The survey of the river below Yingchow should be carried out in greater detail than is necessary above Yingchow towards Tonpai (桐柏縣) and other places along the Fei Ho and Kwo Ho.

(2) *The Yi* (沂) *and the Sze* (泗). In olden times the joint waters of the Yi and Sze entered the Hwai River, but since the Hwai has altered its course the Yi and Sze have done likewise, and it is therefore necessary to make a careful survey in order to determine the best means of draining off the waters of the Yi and the Sze.

(3) *Grand Canal.* Formerly the Yellow River was a menace to the Hwai but the Grand Canal has also not been without its effects on the latter. At the present time the part of the Grand Canal from Tsining to Chinho is sadly neglected and this is having its effect upon the Yi and the Sze.

The above three lines of survey are determined upon with a view to ascertaining the exact distribution of the waters of the Hwai.

(4) *Yuntekwan* (雲梯關). Yuntekwan was a channel from the Old Yellow River into the sea and in earlier times was also one of the channels from the Hwai to the sea. Opinions have been expressed of the possibility or impossibility of restoring this channel but no definite conclusion on this matter can be reached without the collection of more evidence than is at present available.

(5) *Kwanhoko* (灌河口). Kwanhoko in the Haichow district, it has been suggested, might be made the point at which the Hwai River should debouch. This suggestion has been variously received. Looking only for a temporary expedient this proposal would be more attractive than that for the restoration of the Yuntekwan. Without an accurate survey it would be impossible to determine the relative elevations and upon this point would depend the relative difficulties and the advantages and disadvantages of the engineering schemes involved.

(6) *Kwaichow*, (瓜州) *Sankiangyin* (三江營) and *Lohuko.* (六合口) Formerly some of the waters of the Hwai entered the Grand Canal and passed on to the Yangtze but since the Yellow River has changed its direction the Grand Canal has gradually become silted up in many places and the Hwai flows directly to the Yangtze. Many people consider that it will be necessary to restore the old channel of the Hwai in Lohu and Tienchang so as to divide the waters of the Upper Hwai, but without conducting a survey it would be impossible to arrive at any definite conclusion on this matter.

(7) Waterways may equally be harmful and beneficial, and in dealing with them one has to keep both possibilities in mind. In former times there was an abundance of water reserved in the Weishan, Loma. Chinyi, (青伊) Hsuhan (碩項) Hungtze, Chihkuan, (氾光) Peima and Pisha Lakes, which lie along both banks of the Hwai River and these reservoirs of water were of great benefit. Lakes Loma, Chinyi and Hsuhan have now practically become raised land, whilst the Hungtze, Weishan, Chihkuan, Peima and Pisha have very considerably silted up. At the present time the amount of water held by these lake reservoirs has been reduced by fifty or even sixty per cent. The ten districts—Szechow, Hsuyi, Tienchang. Taoyuen, Chinho, Shanyang, Paoyin, Kaoyu, Kiangtu and Kanchien—in which these lakes lie or which they drain have a very extensive area, and it is necessary that not only should the lakes themselves be carefully surveyed but the drainage area should also be surveyed in considerable detail. This survey work should be divided into three sections, namely, (1) North Anhwei, (2) Hsuchow, Hwaian and (3) Yangchow.

(8) The middle part of the Grand Canal from Chinho to Taoyuen and Sutsien is really the old course of the Hwai River, and the question arises, Would it be right to begin conservancy work at the mouth of the Hwai River? To determine this an accurate survey is necessary.

The above surveys are determined upon in order to ascertain at what points the water of the Hwai is to be held in reservoirs and at what points it is to be given free passage.

(B).—AIMS OF THE SURVEY.

It is quite clear that in dealing with waterways it is necessary to remember that water must obey certain natural laws, and those laws must be utilized in securing control of waterways and drainage. The most important aim of the survey should therefore be to secure the fullest detailed information about the basins of the rivers, lakes, and smaller streams; the next point should be an examination and record of the details of the land formation in the immediate neighbourhood of the waterways; and any further details would take a secondary place to these considerations. With such data as we have provided for in the foregoing it would be possible to construct a basis on which the whole scheme of dikes, locks, culverts, and drainage could be laid out.

(C).—SCALES FOR MAPS.

In view of the extensive area to be surveyed the maps and charts must be drawn on an appropriate scale, neither too small nor too large; maps on too small a scale would be comparatively useless, whilst maps on too large a scale would be too inconvenient for practical use. It is decided to adopt scales of 1: 20,000 for the sectional maps and of 1 : 50,000 for the principal maps.

(D).—INSTRUMENTS.

As the survey work is to be divided into ten sections ten sets of instruments will be required. Some of the instruments for special purposes will require to be purchased before-hand, but those for general use may be purchased from time to time as required.

(E).—TIME OCCUPIED IN THE WORK.

The period of time required for the work cannot at present be determined, as it depends upon the area of the land to be surveyed, and this again depends upon the ramifications of the lakes and rivers. In the absence of accurate maps it is necessary first of all to ascertain the more general features of the country, and when this is done detailed surveys will indicate the length of time required for the completion of the work.

(F).—HEAD QUARTERS.

Tsingkiangpu is considered to be the most suitable place for the establishment of central offices, where either a public building may be loaned for the purpose, or a temple or a private residence may be rented.

(G).—STAFF.

(1) *Indoor staff.* The functions of the indoor staff are as follows:—The Resident Director (局長) is responsible for the construction of survey plans and the disposition of the survey parties and for the general progress of the work. The Chief Executive Officer (主任) is responsible

for assisting the Resident Director in all the affairs of the Company and is in charge during the absence of the Resident Director. The Secretary is responsible for the preparation of reports and for correspondence. The Treasurer is responsible for all receipts and expenditures. The Superintendent will examine the work of the surveying parties. Special officers will be appointed to take charge of map-making.

(2) *Outdoor staff.* For the purpose of survey work there will be organized ten parties, each consisting of four members, namely, one overseer, one chief surveyor, one assistant surveyor and one second assistant surveyor.

(H).—SALARIES.

The Resident Director will be given an allowance but no salary as he has public obligations towards his native place. Superintendents will receive pay at a rate one-third less than that fixed when the Bureau of Hwai Conservancy was established in the thirty-second year of Kwang-hsu; and the lower ranks will receive two-tenths less for pay and three-tenths less for travelling than the rates originally decided upon.

This is absolutely necessary in the interests of economy.

(I).—GENERAL EXPENSES.

General expenditure shall be divided under three heads: (1) the repair of instruments, travelling expenses, the purchase of medicine; (2) telegraph charges, postages, allowances, and special rewards; (3) incidentals.

(J).—SOURCES OF INCOME.

It is generally felt that in order to prevent the recurrence of the calamities of the past and to obtain as early as possible the benefits of proper conservancy the work should be put in hand at once. Moreover, if something is accomplished speedily a general sense of satisfaction and of hopefulness is created, whereas, delay in making a start results in general dissatisfaction and distrust. Though it is impossible to raise the money immediately it is still not right to leave the province in constant danger of a recurrence of distress, and consequently two plans have been devised to overcome this difficulty.

(1) Estimates should be made as to the area of land that could be secured almost immediately along the lakes and rivers, and as to how much it would cost to put in hand the first conservacy work connected therewith. It could thus be ascertained how far the value of this land would meet these initial expenditures, and on these data it would be possible to take up shares in the Company.

(2) In order that this work may be undertaken the provincial authorities should be requested to make advances

for the purposes of survey, the appropiation so made to be inserted in the annual budget from the funds for the development of Kiangsu industries. The terms on which such appropriations should be refunded should be decided later.

The preceding ten general regulations have been prepared in accordance with the first Article of the proposed prospectus of the Kiang-Hwai Waterways Development Company. As to the second article relating to the definition of boundaries, the third article concerning the plan to be adopted in the work, the fourth article referring to the methods of paying interest, and fifth article regarding the formation of future plans for the maintenance of the work, action will be taken later.

VII.—REGULATIONS OF THE KIANG-HWAI WATERWAYS SURVEY BUREAU.

The following Regulations were drawn up by Mr. Shu Yuen-ping (沙元炳) the Director of the Bureau:—

Article I.—*Surveying Lines.* The work of survey shall proceed progressively, each section being completed before another is taken up.

Article II.—*Fixed Datum.* The survey datum shall be fixed at Wei Chi Tsai (惠濟閘) and all levels shall be stated in reference to this datum which shall itself be calculated from sea-level.

Article III.—*Surveying Parties.* In accordance with the regulations sanctioned by the Provincial Assembly there shall be ten survey parties, each consisting of one Officer-in-Charge, two Chief Surveyors, one Assistant Surveyor, six Survey Attendants, and one Guide.

Article IV.—*Working Hours of Outdoor Staff.* Under ordinary circumstances work shall be carried on from 6.30 a.m. to noon, and from 1 to 5 p.m., but variations of this routine shall be allowed according to the seasons of the year.

Article V.—*Progress.* The records of progress made shall be kept under two headings, beginning from the time when the parties actually commence their field work.

(a) Triangulation, To fulfil the requirements of Clause I of Article III of the Directions for Field Work each party should accomplish the determination of not less than four stations per day.

(b) Levels. In order to fulfil the requirements of Section 2 of Clause I of Article III each party should determine the levels over 5 or 6 *li* of the triangulated area. In the case of work along the Old Yellow River, where there are exceptional difficulties, this requirement may be reduced to a maximum of 5 *li*.

If these requirements are exceeded the work will be regarded as specially meritorious and shall be specially rewarded at the discretion of the Director.

Article VI.—*Reports.* (1) A summary report of the progress accomplished by the different classes is to be made to the Director by the Superintendent every quarter.

(2) Overseers shall make a report of the progress made by their special group and of the maps, plans, and other

documents completed by those groups and shall submit this report to the Superintendent once a month.

(3) The group reports shall contain tables of benchmarks, traverse tables, calculations of traverse lines and angles, with their relation to the points of the compass, and calculations of latitude and longitude, tables of levels, and triangulations, and reports upon general results. This report, set out under the above headings shall be presented to the Overseer by the Officer-in-Charge every ten days.

(4) Details concerning topographical features, the character of the soil and any historical details bearing upon Conservancy work should be embodied in special reports submitted as occasion may suggest during the course of the survey.

ARTICLE VII.—*Functions of the Various Officers.*

(a) The Director is responsible for the administration of the Bureau and the supervision of all the work.

(b) The Superintendent shall render general assistance to the Director, shall take charge of all documents and make himself acquainted with their contents, shall supervise miscellaneous matters for which no other officer is specifically responsible, and shall act for the Director at any time during his absence.

(c) The Superintendent of Survey shall be responsible for the sectional survey, for the compilation of maps, and for their submission to the authorities concerned, for the general progress of the work in the field, for the appointing and detailing of the staff, and for keeping a record of the conduct and work of all his subordinates.

(d) The principal Surveyor shall be responsible for the plotting of the survey and for carrying out the special instructions issued from time to time by the Director.

(e) The Overseers shall be responsible for the work of the parties under their control and for preparing and presenting to the Director Reports concerning the progress made by their parties; they shall for twenty days of each month inspect and supervise the work of parties in the field and during the rest of the month shall attend at the Bureau and hold themselves at the special disposal of the Director and the Superintendent.

(f) Officers-in-Charge of parties shall be responsible for the carrying out of the actual survey and for the general work of their parties, every member of the party being under their direct control; they shall consult with the Superintendent on all affairs concerning their party.

(g) The Officer-in-Charge of map-making shall be responsible for the compilation of all maps and plans necessary for the use of the Head Office, and shall be under the direct control of the Superintendent.

(h) The Secretary shall be responsible for the preservation of all records and documents and for the safe keeping of the official seal; he shall be assisted by a staff of clerks. Every document before despatch from the Bureau shall bear the counter-signature of the Director. In the absence of the Director ordinary correspondence shall be submitted to the Superintendent in charge of the Bureau before action is taken thereon.

(i) The Treasurer shall be responsible for all receipts and expenditure, and for the administration of the offices. He shall present a monthly financial statement to the Director or to the Superintendent in charge of the Bureau, and this report shall be so compiled as to facilitate a yearly statement of the working accounts. Outside the fixed monthly expenditures no sum amounting to over fifty dollars shall be paid without the sanction of the Director or the Superintendent in charge of the Bureau; and no advances on salaries or wages shall be made.

ARTICLE VIII.—*Leave of Absence.*

(*a*) The Superintendent shall be resident in the Bureau and should he desire leave of absence he must apply for it to the Director who will appoint an overseer to undertake the duties of the superintendent during his leave of absence. A similar rule shall apply to other members of the staff.

(*b*) Overseers shall conduct periodical investigations of the work in the field and will be expected to spend twenty days of each month in travelling over the area of the survey; the remaining ten days of each month shall be regarded as a resting period, during which however they shall reside in the Bureau so as to be available for despatch on special mission. Should an Overseer desire leave of absence he shall obtain it from the Superintendent who will appoint some other overseer to act in his stead.

(c) Officers-in-Charge of a party are responsible for the work of that party and should they desire leave of absence it must be obtained through an overseer from the Superintendent who will appoint one of the Chief Surveyors of the party as acting Officer-in-Charge.

(d) In case a member of a survey party desires leave of absence it must be obtained, through the Officer-in-Charge, from the Overseer, who will appoint a substitute to fill the vacancy thus caused.

(e) Leave of absence shall be limited to ten days, and should this leave in any case be broken pay shall be deducted accordingly. Should any member of the staff exceed his leave by over a month he shall be dismissed. No leave of absence shall be granted to servants.

(f) Applications for leave of absence should be forwarded to the Bureau for purposes of record and should state on what account the leave is desired, the number of days required, the name of the proposed substitute, and the date of resuming duty.

(g) Vacations will be granted twice a year, one in the winter and one in the summer, and shall be of approximately a month in length. During the periods of vacation officers resident in the Bureau will be paid in full; other officers will be placed on half pay but shall be allowed travelling expenses.

(h) All officers should report for duty on the third day before the expiry of vacation.

ARTICLE IX.—*Apportionment of the Work in each Party.*

(a) *Lake Surveys.* The Officer-in-Charge of a party will make a triangulation of the lake areas, and one of the two chief surveyors will assist the Officer-in-Charge in making the survey and compiling the data for a map, whilst the other will devote himself to the taking of soundings and the plotting of these on a chart. All this work, however, shall be done under the direct supervision of the Officer-in-Charge, who shall be finally responsible for all the the work of his party.

(b) *Water Levels.* The Officer-in-Charge shall make the necessary observations for the determination of water levels, one of the two chief surveyors of his party being detailed to work out the calculations and the other to compile sectional charts from the details supplied.

ARTICLE X.—*Administrative Organization.*

(a) The appointment, removal or change of the Head and Assistant Officers of each party shall be made by the Superintendent and approved by the Director, no such changes in the working staff being made solely on the responsibility of the Superintendent.

(b) The surveying sections are to be determined by the Superintendent and submitted to the Director whose decision and sanction shall be final.

(c) Any damage to surveying instruments shall be made good by the party responsible therefor.

(d) The travelling expenses of every party will be paid by the authorities and no demands shall be made by the surveying parties upon any of the residents in the districts under survey.

(e) Provisions and domestic utensils for the use of each party will be provided by the Bureau, but any breakage or loss shall be made good by the party concerned.

(f) All survey parties are enjoined to be courteous and considerate towards the inhabitants of the districts through

(h) The members of each survey party are under the direct orders of the Officer-in-Charge of the party and shall submit to his ruling in all matters concerning the allotment of duties.

ARTICLE XI.—*Examinations and Assessment.* Once a month the Superintendents shall conduct an examination of the work accomplished and report the result thereof to the Director for purposes of record. At the end of each three months the merits and demerits of each party shall be tabulated for comparison:

(A) *Rewards. (a).* Merit marks will be credited to those who attend to their duties with diligence and promptitude, to those who have shown good work in the field, to those who work in harmony with their fellows and without friction, and to those who ask no leave of absence in the three months.

(b) Rewards will be given to those who achieve exceptionally good results in their work, who secure accurate and rapid results, who display special interest in the topographical details of the country, or who receive marks of merit twice in succession.

(c) Promotion will be given to those who show themselves specially capable and worthy.

(B) *Punishment.* (a) Demerits will be recorded against those who are lazy, or lacking in perseverance, who make mistakes in surveying or calculation, or who cause friction and cannot co-operate amicably with the members of their party.

(b) Fines, to be deducted from salary, will be imposed upon those whose progress is unsatisfactory, whose conduct is reprehensible, who ask leave of absence on false pretexts, who act contrary to the terms of Article VIII (d) or who receive two successive demerits.

(c) Reduction of rank will be effected in the case of those whose work is inaccurate and deficient in quantity, who create disturbance, who absent themselves from duty without leave, or who have been twice subjected to fines.

(d) Persons who are frequently sick or absent, who are insubordinate, who frequently ask leave of absence, or have been more than once reduced in rank shall be dismissed from the service.

VIII.—MAIN SURVEY LINES.

The proposal to restore the Hwai River to a proper condition was made with a view to stamping out the calamities that the river has caused since it has followed its present course. For several decades nothing effective has been done, and consequently successive calamities have been increasingly disastrous. The Kiangsu people have recently devoted considerable attention to the necessity for carrying out this special work, and it is known that a delegation has been sent to China by the United States Red Cross Society in order to conduct a survey of the Hwai River, a clear proof that the extent of these disasters is known far and wide. There are two methods of dealing with the Hwai problem, the direct and the indirect. By the direct method is meant the restoration of the Hwai to its original bed, thus giving it a channel of access to the sea; by the indirect method is meant the deepening of the present channels, so that the Hwai has larger and freer outlets. The results will vary in accord with the methods adopted, and as varying schemes are projected it is necessary to consider the whole situation before adopting any one plan. The Hwai River problem involves two provinces, Kiangsu and Anhwei, and therefore there must be co-operation between the two in order to obtain satisfactory results. In accordance with the resolutions passed by the Kiangsu Provincial Assembly, and with the best information available from books and maps as to the prevailing conditions, it will be necessary to adopt two main lines of survey, with Tsingkiangpu as centre.

The First Main Line.

A.—NORTH-WEST OF TSINGKIANGPU.

(1) The Central Grand Canal. The survey line begins from the Yangchwang Dike (楊莊閘) and proceeds towards Yaowan (窰灣) and Lochiayin (陸家營), passing through Tupanshih (豆瓣集), Chunhinshih (衆興集), Sutsien district, Loma Hu and other places for a distance of about 220 *li*; and there would be a branch line from Lochiayin (陸家榮) to Hsiachen (夏鎮) passing through Hsutangshih (徐唐集), Kuliangwangchen (古梁王城) and Hwanglingchwang (黃林莊), in Shantung, and Changchwang (張莊), Hanchwang (韓莊) and other places for a distance of about 250 *li*.

(2.) The South Lotang Ho (南六塘河). The survey line begins at the mouth of the Wuchangpu (武障埧), and passes along the Yen Ho (鹽河), through the Chu Chia Dike (朱家閘), Anchisa (安吉寨), Kushih (古集), and other places to Chienshih (錢集), of a distance of about 110 *li*.

(3.) The North Lotang Ho (北六塘河). The survey line begins from the Lung Ho (龍河) and passes along the Yen Ho through Tiniuko (鐵牛口), Yang Yu (楊圩) Shenshih, (沈集) Chienshih (錢集), Kupashih (古八集), Sheshih (史集) Tingchiachu, (丁家嘴) Tahingshih (大興集), Wuhwachiao (五花橋), and other places on to the Loma Hu, a distance of 250 *li*; whilst a branch would run from Tingchiachu to Liuliaochen, passing through Yanhuashih (仰花集) a distance of 20 *li*.

Note—In former times the confluence of the Yi and the Sze was with the Hwai. At present the waters of these rivers flow down from Lochiayin and other places northwest of Sutsien through the Grand Canal down to Liuliaochien, and finally to the Lotang Ho. But as the Lotang Ho is being silted up it is unable to act, as formerly, as a reservoir, and at the Grand Canal no sufficient outlet is afforded, and the four districts of Pichow, Sutsien, Haichow and Suyang have thereby been much affected. It is necessary, therefore, that the Lotang Ho be carefully surveyed. Lochiayin is a place of considerable importance as it marks the confluence of the Yi and the Sze.

(4). Yi River System. The Yi flows into Kiangsu in four channels, and thus requires four sub-surveys:

(a).—Beginning in Shantung and passing through Tahoyu (大河圩), Luenchishih (龍池集). Chihchiashih (紀家集), and other places to the mouth of the Chulun sluice (竹籠埧) into the Grand Canal, a distance of about 70 *li*.

(b).—Beginning at Chouchiakou (周家口), through Wongfan Hu (王番湖), Tongkou Hu (潼溝湖), to the Loma Hu into the Lotang Ho, a distance of about 100 *li*.

(c).—Beginning at Loukou (廬口), passing east of Pichow to Hsutangkou (徐唐口) to the Grand Canal, a distance of about 50 *li*.

(d).—Beginning at Loukou and passing east of Pichow to Shachiakou (沙家口) to the Grand Canal, a distance of about 50 *li*.

Note.—The Yi begins at Chouchiakou, flows direct to the Lotang Ho, passing through the Loma Hu. The old course of the Yi was by way of Malingshan (馬陵山), but that course is now dried up. The Loma Hu, being silted up, cannot receive all the waters of the Yi, which is therefore compelled to fight for a passage to the Grand Canal near the Chulun sluice, and thus Pichow, Sutsien and other places are affected. The deepening of the Loma Hu, in order to restore the river to its old course, has been advocated.

(5.) Sze River system. The survey line for this system begins from Hsutangshih, and passes through Yangshan (羊山) Chienhoshih (泉河集) Kinshanchiao (荆山橋) Yenmatu

(嚴馬頭), and other places to the Weishan Hu, a distance of about 150 *li*.

(6.) Weishan Hu. This lake is situated in the upper part of the Central Grand Canal. There are many who advocate the making of the Weishan Hu into a big reservoir for the relief of the Grand Canal, but as the conditions have greatly changed a detailed survey is necessary before it is possible to decide whether, (*a*) the lake is capable of receiving the water coming from different sources without danger of serious overflow; (*b*) whether it is possible to drain the lake and convert the silted portions into cultivable land without affecting such streams as the Central Grand Canal and the Lotang Ho in the lower part of the lake.

(7.) The Old Yellow River. The survey line begins from Yangchwang westward, passing through Taoyuen, Yang Ho (洋河) and other places as far as Sutsien, a distance of about 180 *li*.

Note.—The district from Sutsien to the Old Yellow River has very little connexion with the Hungtze Hu and therefore the survey of this river need only be conducted as far as Sutsien.

(8.) Chentze Ho (成子河). The survey line in this district begins from Chenchwang (陳莊) and proceeds to the Hungtze Hu, passing through Pochia Hu (卜家湖), a distance of about 20 *li*.

Note.—This river has long been so silted up that only traces of it are to be found, but in former times it had a channel leading to the Hungtze Hu that is not without present interest.

(9.) Huta Ho. (枯大河). The survey line of this district begins from the mouth of the Luenmen (龍門口), on the southern embankment of the Old Yellow River, and passes through Fanchia Hu (范家湖), Kaochiasung (高家松) and Liupouchen (劉婆澗), for a distance of about 50 *li*.

Note.—At one time this stream was uninterrupted, but at the present time obstacles are to be found almost throughout its course, and within recent years the stretch from Kaochiasung downwards has rapidly silted up, a fact which is largely responsible for the occurrence of inundations in the eastern part of the Taoyuen district.

(10.) The Su Ho (沭河). The survey of this river is to be carried out in two directions. The first line begins at the north mouth of the Lotung Ho, and passes through Kingtangkou (經湯溝) Shitzechiao (十字橋) Luenerhchwang (龍兒莊), Malingshan (馬陵山) Hsinan, (新安) and other places on to the boundary of Tanchen (郯城) in Shantung, a distance of 240 *li*. The second line begins from Hsinpukou, (新浦口) and passes through Huwanyu (後灣圩), Shangfang (上房) and other places in the north of Haichow, down to the main body of the river in the south-east of Suyang. This second line splits into two minor lines:

(*a*) Through Kaohsu (高墟) and the southeast of Hanshan (韓山), round the Suhang Hu (碩項湖), at which point a further subdivision takes place, one line passing through Wushih (吳集), Yangchiachen (陽家澗), and other places down to the main body of the river, and the other line passing through Yuyu (郁圩), Kwantienyu (官田圩), and other places to the main body of the river, all being in the southeast of Suyang.

(*b*) Through the Chinyi Hu (靑伊湖) directly, from which point again there are two two subsidiary lines, one passing through Tafangshih (大房集), Chouyu (周圩) and other places to the main body of the river, and the other passing through Mayu (馬圩), Miaotuchen (廟頭鎮), and other places in the northwest of Suyang. The whole length of this survey will be about 300 *li*.

(11.) *Shachiang Ho* (砂礓河). The survey line begins from the north west of Tahingshih (大興集) passing through Chwanch'enchen (穿城鎮), Peyu (裴圩), Tingshih (丁集), and other places down to the linking point with the Su Ho, a distance of 80 *li*.

B.—NORTH-EAST OF TSINGKIANGPU.

(1.) *Yen Ho*, (*or Salt River*). The survey line begins from Hsuankingcha (雙金閘), passing through Hsipa (西垻), Wuchangpa (武障垻), the mouth of the Lotang Ho (六塘口), and other places to Haikow (海口), beyond Hsinpu (新浦), a distance of about 200 *li*.

(2.) *Chao Ho* (潮河). The survey line here begins from Wuchangpa, and passes through Sungchiashih (宋家集), Hsianshuikou (响水口) Tienchialu (田家樓) and other places to Haikow, a distance of about 180 *li*.

Note.—According to old records it has often been suggested that the water of the Hwai should be drained to the Yen Ho, thence to the Chao Ho, and finally to the sea. This scheme was recently advocated in a memorial to the Throne by Mr. Yun. A detailed survey is necessary in order to ascertain whether this plan is feasible.

(3.) *Mingpi Ho* (民便河). The survey line begins from the district of Antung (安東), passes through Yangchihkan (楊祺杆), Tangshih (唐集) and other places, to Tien Hu, (佃湖) a distance 80 *li*.

(4.) *Yihfang Ho* (一帆河). The survey line begins, at its southern end, from the Mingpi Ho, and passes through Hsishih (薛集), Tahingshih (大興集), Choutu (周渡) and other places to the Chao Ho, a distance of about 80 *li*.

(5.) *Makong Ho* (馬港河). The survey line begins from Tatungkou (大通口), and passes through Tunlingchwang (東林莊), Miaochiacha (苗家閘), Kouchiaowan (過橋灣), Lichwang (李莊) and other places, joining the Chili Ho

(七里河), to Hsiangshuikou (响水口) a distance of about 50 *li*.

Note.—During the reign of Kang-hsi Tatungkou was called Lanhwangpa (攔黃垻), meaning a barrier to force the Hwang Ho to flow into the sea through the Chao Ho and from Makong Ho. Afterwards, the Chao Ho gave a good deal of trouble, and the Imperial Commissioner for Conservancy Work residing at Kaifengfu, Honan, H. E. Chang (張文端公) decided to remove the barrier, thus allowing the Hwang Ho to flow eastwards into the sea by its old course. Hence the Makong Ho was neglected.

(6.) *Taiping Ho* (太平河). The survey line begins at Liutao (六套) on the north bank of the Hwang Ho, and passes through Tuchia (頭甲), Moupankong (磨盤港) and other places to the Chao Ho, a distance of about 50 *li*.

(7.) *The Old Yellow River* (廢黃河). The survey line begins from Yangchwang on the east and passes through Hsipa, Sanvin (三營) Antung, Hsinanshih (新安集), Chiaolingshih (交陵集), Tungyin (童營), Peshachen (北沙鎮), Yuntekwan, Chenchiatan (陳家灘), Paitan (八灘), Hsiaoshih (小集), Tayukien (大淤尖) and other places to Liuhungtze (六洪子), a distance of about 400 *li*.

C.—SOUTH-WEST OF TSINGKIANGPU.

(1.) *Changfoyin Ho* (張福引河). The survey line begins from Weichitsai (惠濟閘), and passes through Kaoyei (高堰), Hsunhoshih (順河集), and other places to the Hungtze Hu, a distance of about 40 *li*.

(2) *Tienjenyin Ho* (天然引河). The survey line begins from Yangchwang, passing through Chenshih (陳集), Hsiaowongshih (小王集), and other places to the Hungtze Hu, a distance of about 30 *li*.

(3) *Hungtze Hu*, its surroundings, and various minor feeders, totalling some 800 *li*.

(4) *Hwai Ho*. The survey line begins from Pelokong (不落閤) in the district of Yuyih (Anhwei), passing through Hsihutan (西河灘), Taliukong (大柳港) and other places down to Fushanshih (浮山集), a distance of about 50 *li*.

Note.—The pouring of the waters of the Hwai into the Hungtze Hu is the immediate cause of many inundations. The overflow of the Hungtze Hu is doubtless caused by the closing of the mouth of the Chin Ho and the consequent lack of outlet for the waters of the Hwai. If the levels of the present Hwai and the old Hwai could be ascertained and compared the relative advantages and disadvantages of restoring the old Hwai would then be seen. It is now proposed to conduct this survey as far as Fushanshih, and west of Fushanshih is to be covered by another survey.

D.—SOUTH-EAST OF TSINGKIANGPU.

Inner Grand Canal (裏運河). The survey line begins from Weichitsai (惠濟閘) and passes through Tsingkiang, Hwaian, Paoyin, Kaoyiu, Shaopei, Yangchow, and other places to Kwaichowkou (瓜洲口), a distance of about 400 *li*.

The Second Main Line.

A.—NORTH-WEST OF TSINGKIANGPU.

(1).—*The Old Yellow River.* The survey line begins from Sutsien and passes through Old Pichow, Tongshan, Yangshan and other places to the boundary of Honan, a distance of about 400 *li.*

Note.—The surface level in Hsuchow is higher than in Anhwei, and consequently the water coming down from Tongshan and Sutsien and passing through Lingpi, (靈璧) Nansuchow, Fengyang, Szechow, and other places, flows into the Hwai. If the Old Yellow River is to be deepened it is necessary to take the situation of the land and the nature of the work into careful consideration before deciding whether it is possible to begin work from Yangshan (碭山) and to drive the water from the north of the Hwai into the Old Yellow River.

(2.) *Shu Ho* (睢河), The survey line begins south of Yangshan and passes through the Yungchen district (永城縣), Hsichia Hu (薛家湖), Changsa (張寨), and other places into the province of Anhwei, through Nansuchow, Lingpi, north of Szechow, southwards through Chinyangchen (青陽鎮), Hsichiashih (石家集) and other places to the Hungtze Hu, a distance of about 600 *li.*

Note.—The Shu Ho crosses north of the Hwai, and has been the direct source of floods in Lingpi, Nansuchow, Szechow and other districts along the river during recent years. It has been suggested that the conservancy of the Shu Ho should precede that of the Hwai, but it appears reasonable that as the Shu Ho is one of the big tributaries of the Hwai the latter should be undertaken first, for there would not be sufficient outlet for the waters of the Shu Ho if that stream were first restored.

(3.) *Mingpi Ho* (民便河). This survey takes two lines: (a) from Yanghochen (洋河鎮) and Hantchakou (旱閘口) through Kweijente (歸仁堤) to Chatanshih (閘塘集), south-east of Anho (安河), through Munchiawan, (孟家灣). Kingsuchen (金鎖鎮) and Lolotan (螺螺灘) to the Hungtze Hu, a distance of about 150 *li*; and (b) from southwest of Chatanshih, through Kweijente, Kweijenshih (歸仁集), and Wongchiataokou (王家道口) to the Szeshan Hu (四山湖), a distance of about 60 *li.*

Note.—This river is the receiver of all the streams coming from the west of Kweijente. Below Munchiawan is the central point in the Shu system as it converges on the Hungtze Hu.

(4).—*Chuenchia Hu* (崔家湖), *Munshan Hu* (孟山湖). *Lingtze Hu* (陸子湖) and *Yangtun Hu* (楊潼湖). These lakes are all receivers of the waters of the Shu Ho, and the survey lines in connexion with them total about 150 *li.*

B.—SOUTH-EAST OF TSINGKIANGPU.

(1).—*Wupa Ho* (五垻河). The survey line begins from Wupa, and passing through Paoyin Hu divides into five sub-surveys, with a total length of about 280 *li.*

Note. The Wupa Ho has recently become the channel connecting the Hwai and the Kaopao Hu, and the Inner Grand Canal. If the old course of the Hwai is to be restored the question of closing the Wupa Ho should be considered after the completion of the survey.

(2).—*Peima Hu* (白馬湖), *Paoyin Hu* (寶應湖), *Chashu Hu* (界首湖), and their surroundings. The survey line of these lakes totals about 55 *li*.

(3).—*Shaopei Hu* (邵伯湖), *Loyang Hu* (菉陽湖), and their surroundings. The survey lines in these lakes total about 55 *li*.

Note.—These lakes, situated in the lower part of Wupa are connected with the Hwai and the Grand Canal.

(4) Rivers to the east of Yuente (運堤). The survey of these rivers falls into three divisions:

(1) beginning from Kinghocha (涇河閘), passing through Tsaotien (曹甸), to Machiatang (馬家蕩), and Yaohokou (窰河口), in order to make a survey of the whole Hsiavang Hu (射陽湖), thence onwards through Menluen (朦朧) Miaowan (廟灣), and other places to the mouth of the Hsiayang Hu (射陽湖), a total survey line of 400 *li*; (2) beginning from Yaohokou, across the Hsiayang Hu, across Loukou Ho (蘆溝河), Fengtze Ho (封子河), Yenchen (鹽城), and other places to the mouth of the Hsinyangkong (新陽港), a total of 350 *li*; (3) beginning from Chaolopa (車邏垻), Wulipa (五里垻), and other places, by Chentze Ho (澄子河), Putuh Ho (白塗河), Hsin Ho (新河), and Tungtau (東臺) to the mouth of the Touluenkong (鬬龍港), a total of 400 *li*.

Note.—The river system east of Yuente is very complicated indeed and no action should be taken with regard to it until a complete survey has been made. Suggestions have been made that all these rivers be banked, but it would appear that the only result of this work, unless counteracted by other and very extensive works, would be to swell the volume of water in the Hwai and enable that river to cause even greater damage than in the past. Only a complete survey can determine exactly what is to be done.

C.—SOUTHWEST OF TSINGKIANGPU.

(1.) *Hwai Ho.* The survey line begins from Fushanshih, passes through Wuho (五河), Linghwai (臨淮), Hwaiyuan (懷遠), Shouchow (壽州), and other places northward to Yin Ho (穎河), through Yinshang (穎上), Liulingshih (留陵集), and other places to Yinchow, a distance of about 100 *li*; and a further section runs from the mouth of the Yin Ho through Chinyangkwan (正陽關), Tangchia Hu (唐家湖) and other places to Shanhokien (三河尖), a distance of about 120 *li*.

Note.—The main original channel of the Hwai is to be traced in Honan, travelling hundreds of *li* in its many curves and recurves. After passing through Taliukong (大柳港) it flows abundantly into the

Hungtze Hu. Unless the basin of the Hwai and Yellow Rivers are in proper relations it is doubtful whether the Hwai, to the of westFushanshih and east of Tongpei can follow their course without hindrances, opinion is divided as to the exact nature of the conservancy work to be undertaken here. After heavy and continued rains the land that should be drained by the upper Hwai is flooded though the Hungtze Hu is not full; and in time of drought the lake dries up though there is still a flow of water in the Hwai. The Fei, Kwo, Chuen (茨), Kwei (澮), and other rivers flowing into the Hwai are closely involved in its fortunes, and if conservancy work be confined to the Hwai it is certain that the water will not follow its natural course in the others river, but cause floods. It would be part of the work of the survey to obtain full details as to these matters.

(2.) *Konyuwong Ho.* (古禹王河) The survey line begins at Yuyihko (盱眙口), passing through Hailingchiao (黑林橋), and Tongch'engchen (桐城鎮), by way of Tienchang, southward by Kingniushan (金牛山). then dividing into two sub-surveys; one taking a line towards Kwaipu (爪埠) to the Yangtze, and the other towards Peimoupai (白茅扳), south of Fangshan (方山), also to the Yangtze, the total length being about 400 *li*.

Note.—This river is situated in upper Wupa. It was once proposed by the Imperial Commissioner for Conservancy Work that this river should be dredged in order to facilitate the conservancy of the Hwai and the Yellow River. The proposals would, however, involve heavy expense and have not met with public approval, so that nothing has been done. It is essential that a thorough survey be made, indeed, before anything practical is attempted.

The above outline of principal survey lines has been made in accordance with the latest available information, but is subject to modification necessitated by changes that may arise out of natural causes, some of which are proceeding rapidly.

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IX.—INSTRUCTIONS FOR FIELD WORK.

The following instructions for field work were drafted by Mr. Chang Chien.

(1).—*Relation of the different River Basins.*—It is well known that water must obey certain natural laws. If water is abundant at a river source but has not sufficient outlet it is obvious that at a certain point the water will reach a level at which it can be no longer contained and floods are bound to occur. Again, if one basin is higher than a second basin through which the waters of the first basin must pass in order to reach the point of outflow there is in this case even greater danger of overflow. The first business of the survey should therefore be to secure the fullest possible information regarding the levels of the respective basins, thus affording a basis upon which operations may afterwards be conducted.

(2).—*Levels of Land and Rivers.*—If the bed of a river is raised the effect will be the same as that of lowering the surrounding land, and if the river bed is deepened this will have the same effect as raising the surrounding country would have. It is impossible to determine which river bed is to be raised in order to give its waters an adequate fall, or which river is to be deepened in order to prevent overflow, until the actual conditions as to land level and river bed have been ascertained. Thus the determination of land levels is an important part of the survey.

(3).—*Heights of Beds and Banks.*—The general mistake that has been made in the past in conservancy work has been that the banks have been raised without any attempt to keep the river bed clear and the result has been that the river bed by silting up has been raised almost as much as the embankment and thus the danger of flood has not only not been removed but has actually been increased. It is therefore necessary to ascertain and record the relative heights of the river beds and of the embankment and at the same time to determine the relation of these to the land surface. It is also necessary to ascertain the volume of water in the river at ordinary times and at times of exceptional rain or exceptional drought. The collection of these data is a necessary preliminary of any effective conservancy work.

(4).—*River Beds, Dikes, Sluices and Culverts.*—The survey should take note of all details with regard to existing

Dikes, Sluices and Culverts, and also of changes in the volume of water in different parts of the river bed brought about by their influence, and any necessary or advisable changes to be made in the position, shape or size of these constructions should be carefully noted.

(5).—*The Two Banks of a River.*—As the two banks of a river may be of different heights both with regard to the level of the water and to that of the surrounding country it is necessary that the surveys of the two banks should be independently conducted. It is only by independent surveys of the two banks that satisfactory conservancy plans can be formulated.

(6).—*Extent of the Survey from the River Bank.*—The height of the embankment varies so much in relation to the land that it is necessary to extend a survey a considerable distance from the river in order to secure the safety of places somewhat remote from the embankment. For instance, in Kaoyu and Paoyin the embankment is only a few feet lower than the city wall, whilst in Antung the city wall is below the embankment. In former surveys these differences have been neglected and the only object of the conservancy work that has been attempted has been to secure local immunity from flood without regard to the needs and difficulties of places lower down or higher up the stream. In conducting the present survey this practice must not be followed and there must be a detailed record of levels for a distance of 500 metres from the river bank.

(7).—*Surveys of Tributaries.*—The importance of some of the tributaries of the main rivers is apt to be overlooked. The Mingpi Ho, which lies between the Yen Ho and the Hwai, and the Tienjen Ho and the Changfo Ho, situated between the Grand Canal and the Hwai, owe their importance to the fact that they can take part of the overflow from the larger streams and can thereby relieve the pressure on embankments and reduce the danger of flood. Some of these smaller water courses have long been silted up but others still remain, and it should be part of the work of the survey to make a record of the facts in order that it may be known where and to what extent dredging and similar work will be necessary.

(8).—*A Daily Record.* A daily record should be kept at each station of the volume of water in the river, the shape of the bank, the length of the embankment, the rise and fall of the water level, and other details, and though these facts cannot be shown upon the map they should be embodied in a special report to be forwarded to the Bureau.

(9).—*The Current.* Observations should be made as to the rise and fall and the speed of the current both at normal times and at other times. The outlet capacity of the river mouth should also be noted daily.

(10).—*The Reservoir Lakes.* In order to ascertain the storage capacity of the lakes, and at the same time to calculate the area of land capable of reclamation, detailed surveys and soundings of the lakes must be taken in hand.

X.—THE RECORDING OF WATER LEVELS.

The recording of water levels must be preceded by the fixing of bench marks. The recording of water levels and of water marks and a comparison of these with bench marks will indicate the extent of flood and the variations in the shape of the rivers. The interpretation of the data collected will require careful study after the details concerning rivers and lakes have been collected and generalized. For the time being it is proposed to set up water marks (1) in Songkingtsai (雙金閘), Yangchwang (楊莊), and other places in order to ascertain the rise and fall of the Central Grand Canal and its surface extension; (2) in Shunhoshih, (順河集), Kaoyen (高堰), Matuchen (碼頭鎮), and other places in order to ascertain similar details with regard to the Changfo Ho (張福河); (3) in Yenhotsai (鹽河閘), Hsipa, (西壩), and other places for the Yen Ho. Songkingtsai is the point at which the Grand Canal and the Yen Ho meet, and Matuchen is the point at which the Grand Canal and the Changfo Ho come together. By water marks at the above places the relation between the different rivers may easily be ascertained. These investigations should be embodied in a report showing:

(*a.*)—The places and numbers of the water marks:—

Name of the Place.	Number of Marks.
Songkingtsai	Nos. 1 and 2
Yenhotsai	„ 3 and 4
Yangchwang	„ 5
Matuchen	„ 6
Chunhoshih	„ 7
Hsipa and Yen Ho	„ 8

(*b*).—The following details:—

1. Name of the Place; 2. High Water Level; 3. Mean Water Level; 4. The Time of day at which the Water levels are taken; 5. The Number of Water levels.

(*c*).—The Time of taking Records, which shall be from 10 to 10.30 or from 11 to 11.30 in the mornings, and 2 to 2.30 or 3 to 3.30 in the afternoons.

(*d*).—Division of the Work of taking Records amongst the Survey Groups.

Name of the Group.	Place of the Water-marks.
First Group	Hsipa
Second Group	Songkingcha
Fourth Group	Yangchwang
Sixth Group	Matuchen
Seventh Group	Yenhocha
Eighth Group	Shunhoshih

(*e*).—Procedure in erecting Water-marks, namely; (1) to determine the level with reference to bench marks; (2) to record heights in tabular form.

Note.—Before taking record of water-marks these must be checked by theodolite in order to ascertain whether the marks have been removed or not.

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XI.—METHODS OF SURVEY.

The following survey rules have been drafted in pursuance of the regulations of the Kiang-Hwai Waterways Development Company by Messrs. Sa Yuen-ping (沙元炳), Resident Director and Yuan Chen-tzen (袁承曾), Superintendent of Survey.

I.—GENERAL PRINCIPLES.

Clause 1.—The object of the establishment of the Kiang-Hwai Waterways Development Company, in accordance with resolutions passed by the Provincial Assembly of Kiangsu, is to survey the hydrographic system of the Hwai River with a view to adopting plans upon which, in future, conservancy work can be undertaken in the district. Surveys are of two kinds, general and detailed. The object of the former is to gather a general view of the district surveyed, whilst the object of the latter is to verify the results of the general survey, to secure greater accuracy in it, and to amplify it by filling in additional local details. The survey lines set forth in a preceding chapter have received the general approval of the Provincial Assembly. The first main line involves the survey of over 4,000 *li* and if the whole of this district were to be surveyed in detail, section after section, the expense involved would be more than the Tls. 40,000 or Tls. 50,000 provisionally allotted for the work; and the time necessary for carrying out such a survey would be much more than the two or three years provided for under the scheme. The results achieved would be out of proportion to the time and money expended and it is therefore intended that the general survey shall only be supplemented by a detailed survey in those places where it appears possible to make an early start with effective conservancy work. This work, according to the arrangements made, should be almost immediately reproductive and thus should be able in some measure to pay its own way.

Clause 2.—The general survey will pay attention to rivers and lakes, whilst the field work will include fixing of levels, bench marks, and map-making. Such matters as observations on the strength and volume of currents are dealt with below.

II.—RIVER SURVEYS.

Clause 1.—*Reducing to datum.*—(*a*). In order to determine levels and the actual position of bench marks it is necessary to conduct a survey along both banks of the river in a straight line, and at the end of this line a reduction to datum is to be made.

The land levels are also of great importance and the determination of these should be carried out by those responsible for the topographical survey, though it may be carried out when convenient by those engaged in survey of the embankments. The land levels may be determined by offsets from the river line. When determining the position of bridges, dikes, sluices, etc., notes should be taken of variation in water levels.

(*b*). Survey stations are to be not less than 200 metres apart.

(*c*). The intersections of the traverse lines must be numbered, and marked consecutively, in each section; thus, if one section contains twenty intersections they shall be numbered 1 to 20; but the next section shall recommence the numbering of its intersections from 1 onwards.

(*d*). Bench marks serve two purposes, temporary and for future reference. For temporary purposes bench marks must be clearly indicated on the map for the guidance of those who will carry out detailed surveys from the traverse lines. The position of bench marks shall be shown by pegs driven into the ground and marked with their number. If any natural object offers itself for this purpose it should be duly noted and used as a check in case the peg should be displaced and lost. For purposes of future and permanent reference fixed points should be established at distances of 20 *li*, advantage being taken of any prominent features such as monuments, prominent buildings, etc., at the discretion of the surveyor.

Note.—The foregoing instructions are intended for the guidance of those taking water levels and also of those determining base lines; if these two are taken simultaneously there will be no need for the erection of temporary marks. Detailed variations of this kind are left to the discretion of those actually engaged in the work.

(*e*). At every important point in connexion with the hydrographic work a special officer will be appointed to keep a record of soundings and their variations.

(*f*). *River sections.* At every 5 *li* a cross section of the river should be taken. The first step is to measure the width at surface level by means of a line, then to take soundings from one side to the other and to enter these in the record, at the same time noting the strength and velocity of the current and quality of the soil on the adjacent banks. In the basin of the Old Yellow River the surface is very broad and in many places the stream is dried up; in these places the survey must be conducted with theodolite.

(*g*). At intervals of 5 *li* a closing point of the section should be marked.

(*h*). *Order of the work.* Where the distance from one side of the river to the other is considerable the survey of the two sides may be taken on separate days, but where it is possible the work should be carried out in one day, the left side being done in the morning and right side in the afternoon.

(*i*). When a record is completed it should be kept by those who are to be responsible for the bench marks in order that they may mark down the figures in the map.

(*j*). The record should show: the depth of water; the rise and fall of water; the nature of the soil; the sectional area and the volume of the river; the velocity of the current; and any changes in the general conditions of the rivers or lakes, and any other special details. This record is to be presented for inspection along with the report of the work done.

Clause 2.—*Land Surface Features.* (*a*). Land on each side of the banks for a distance of 500 metres and coming under the direct influence of the river is to be included in the survey.

(*b*). Such works as bridges, dikes, sluices, etc., should be examined in detail and the facts concerning them should be recorded. Villages, hamlets and towns outside the direct influence of the river need not be surveyed in detail, but their positions should be determined and recorded.

(*c*). Connecting points should be at a distance of not more than 200 metres from each other in accordance with the arrangement of surveying stations.

(*d*). Every bench mark fixed should be marked on the map with its reference to the fixed datum.

(*e*). Places beyond the direct survey should be calculated by means of survey poles and their position properly shewn with reference to the base line.

(*f*). Closing points shall be determined as frequently as possible by triangulation.

(*g*). Draft plans shall be prepared on the basis of the facts collected under the above headings.

(*h*). For bridges, dikes and sluices, front and side elevations should be taken and marked in the draft map.

(*i*). The scales adopted should be as follows:— For maps of the Yen Ho, Grand Canal and other connected rivers the scale shall be 1: 10,000; for maps of the Old Yellow River the scale should be 1: 20,000; but these scales are subject to variation as circumstances shall suggest.

(*j*). A complete record shall be kept of the position and shape of all bridges, dikes, sluices, embankments, river sections and other details.

III.—SURVEY OF LAKES.

Clause 1.—*Triangulation.* This presents more difficulties than are likely to be encountered in the river surveys, but by the use of the theodolite fixed points can be secured and the rest of the procedure will be the same as in the river surveys. In order to make survey poles more easily seen small flags may be attached to them.

Clause 2.—*Soundings.* Survey poles will be erected along the banks of the lake and properly numbered, and lines of soundings will be taken between pairs of these posts, 100 metres being allowed between one sounding and another.

Clause 3.—*Lake Surface Levels.* In taking the level of the surface of a lake it should be first directly referred to the land level because, the bed of many lakes having been raised by silting and the outlet of many lakes being insufficient, the surface level of the lake bears a false relation to the surrounding land levels. The land level is of course referred to original datum and thus the lake surface level is easily ascertainable. Whilst taking lake surveys detailed information should be sought from the local inhabitants as to the points at which the waters of the lake successively overflow at times of flood.

Clause 4.—*Scale for Lake Charts.* Owing to the great variations in the size and shape of the lakes, and to the difference between their conformation and that of rivers, the scale adopted for the river surveys is unsuitable for the lake charts and it is therefore proposed to adopt a scale of 1: 25,000; this point will be left however to the discretion of the surveyors in each particular case.

IV.—MAP MAKING.

Clause 1.—*Charts of Levels.* These charts should be compiled from the fieldbook of those who conduct the survey, and should show all the survey stations and bench marks. Notes on the depth and velocity of water, on the general features of lakes and rivers, and other details of a like kind, should be added as an appendix to the map for purposes of reference. Each chart or map should be properly numbered in an orderly series.

Clause 2.—*Sectional Maps* (*a*). Maps of longitudinal sections should be done in the Japanese form and may be shown either on the same sheet with the general map or on a separate sheet of the same size as the general sheet, the horizontal scale being the same as that adopted for the general map whilst the vertical scale will be 1/20 of that adopted in the general plan; so that, for example, if a scale of 1:5,000 is adopted for the vertical lines in the plan, the longitudinal section will be to scale of 1:250. (*b*) Cross sections may be drawn either on the general map or shown on separate sheets, but in either case they should be made consecutively and numbered according to their position along the course of the river. The horizontal scale for cross sections shall be ½ that adopted in the general map: and the vertical scale shall be 1/20 that of the general map.

Clause 3.—Drawings of such structures as bridges, dikes and sluices should show both front and side elevations, and their position should be indicated on the general maps according to the directions given in clause 1 of Part II. These drawings shall be on the scale of 1:200.

Clause 4.—*Orientation.* It is not necessary to orientate all maps for the north. The orientation may be made to suit the natural course of the river but on every map the points of the compass must be clearly shown in order to avoid confusion.

Clause 5.—*Symbols.* (a) Triangulation points must be marked with the letters of the alphabet.

(b) Bench marks should be shewn thus: ⊙ (1) 34,12

(c) Land levels should be shewn thus: . (31,25)

(d) Soundings in lakes are to be marked thus: .—1,3

(e) Level of river bed is to be shewn thus: . 21,34

In the case of lakes indications of the bed level will follow the sounding record, as: —1,3/.31,34

(f) Special forms of lettering must be used to indicate the sizes of the different cities, towns, and villages.

(g) The figures used for all numbers will be the Arabic numerals; all other marks will be in Chinese.

(h) For rivers running in a north and south direction the characters will read from left to right; for rivers running in an east to west direction the characters will read downwards.

Clause 6.—All cities, towns and villages having a direct interest in or dependence upon the condition of the waterways should appear on the maps.

V.—APPENDIX.

(*a*). Calculations of the areas of river and lake basins are to be made by triangulation.

(*b*). Calculations of velocity of currents and force of water are to be made from cross section measurements and with a current-metre.

(*c*). Calculations of volume of water are to be made from soundings and velocity known at different cross sections.

(*d*). Calculations of earthwork required are to be made when the time comes for drafting estimates.

XII.—GENERAL INSTRUCTIONS TO SURVEYORS.

The following general instructions were drafted by Mr. Yuan Chen-tzen (袁承曾), Superintendent of Survey.

(1).—*Closing Difference.*—In the closing circle the difference of one point from another, any difference in heights, and the average corrections made at each point should be accurately recorded for purposes of reference.

(2).—*Scales for Maps.*—For work along the Yellow River a scale of 1: 2,000 is to be adopted, whilst for work along other rivers a scale of 1: 10,000 is to be adopted instead of that of 1: 5,000 originally decided upon. In conducting the survey this time emphasis is to be laid upon geographical configuration rather than upon landmarks, and if the scale of 1: 10,000 is adopted the work will be considerably easier and quite as effective. Hereafter all surveying groups are to adopt this scale of 1: 10,000 in their maps, and maps already made should be reduced to this scale.

(3).—*Scale for Cross Sections*—It was originally decided that the horizontal scale on drawings of sections should be half of that in use for surface work, but actual experience shows that in the survey of the Yen Ho, the Grand Canal and other streams that scale was too small, even whilst the general scale was 1 : 5,000. Now that the scale has been reduced to 1 : 10,000 the adoption of half that scale would be very inconvenient; and it is decided that the horizontal scale is to be changed to 1/10 and the vertical to 1/50 the scale; for the survey of the Old Yellow River the scale is changed to 1:20,000, and hence the horizontal scale for sections should be 1:4 and the vertical scale 1:40. A report presented by Mr. Shen Ping-wong, dealing with the Old Yellow River, suggests that when the width of the surface is within 5 *li* the original scale is to be adopted, but when it is over 5 *li* the horizontal and the vertical scales are to be 1:10,000 and 1:500 respectively. This is a suggestion that is worth consideration and the decision shall rest with the surveyors in the field who will act as circumstances may suggest.

(4).—*Maps of the straight cut line.*—The map of the Old Yellow River will be completed after the survey work of all parties has been done. With regard to the other rivers representations have been made by the Overseer and Officer-in-charge that at intervals of 50 *li* sectional maps should be made with a horizontal scale of 1:50,000 and a vertical scale of 1:250 and the levels marked in at every *li.* The method originally decided upon would have required considerably more labour,so it is now arranged that the horizontal scale shall be 1:50,000. Though by this method positions are not so conspicuously shown, yet the map will amply serve its purpose of marking the position of the different points. All the parties are therefore instructed to follow this procedure.

(5).—*Recording Tide levels.*—In the report presented by Mr. Shen Ping-wong, the overseer, it is stated that the Fifth Surveying Party placed a tide-gauge watermark at the north-east of the Koliangjen Dock, as that was a suitable position, and that a monk of the Fengshen Miao (Temple of the God of Wind) has been employed to take records of variations in the water levels in consideration of a payment of $2 a month. The question has been raised whether such procedure is to be adopted elsewhere. Mr. Shen approves of the plan but points out that the number of such arrangements should be confined to specially suitable places, for though it is admitted that the plan is a good one it is necessary to reduce expenditure as much as possible.

(6).—*Bench Marks.*—The Old Yellow River, the Yen Ho, the Grand Canal and other streams are to be conspicuously shown on the map and special notes should be given on the current, the volume of the water in the river bed, the regimen of the river, etc., Bench marks shall be calculated from sea level, but at present only the names of places and the number and position of the survey stations are to be shown in the map, bench marks being inserted later. Sea level shall be indicated provisionally.

(7).—*Map Details.*—Embankments should be represented by a double line in light red, the space between the two lines indicating the width of the embankment. Water shall be shown in a light blue colour.

* * *

XIII.—INSTRUCTIONS FOR SECOND SURVEYS.

The following second survey instructions were drafted by Mr. Yuan Chen-tzen (袁承曾), Superintendent of Survey and approved by Mr. Sa Yuen-ping (沙元炳), Resident Director.

(1).—Scales of 1: 10,000 are to be adopted for maps indicating water levels; of 1: 1,000 for horizontal cross sections; and of 1: 200 for vertical cross sections; of 1: 50,000 for the horizontals and of 1: 250 for the verticals in the maps of the straight cut lines. In lake charts a scale of 1: 25,000 is to be adopted for the horizontals. General procedure will be the same as stated in the instructions already issued.

(2).—The closing difference must be clearly stated in the record. If in any circle the closing difference is great the survey must be reconducted in order to reduce the difference sufficiently for practical accuracy. The records of the preliminary, the revised and the final surveys must all be presented to the Bureau for reference.

(3).—The symbols used in the sectional maps will be the same as those used in the general maps. The reference to bench mark the circle and the number will be shown in red. Land levels and circle will be shown in blue, the number being in red within brackets of blue colour. To indicate the height of the river bed a red point will be marked with an accompanying number in blue. The fixed datum will be marked by a black circle within a red one. The datum number will be indicated according to the method at present in use. Characteristics and numbers in sectional maps will be the same as in general maps but the number must be marked at each point and the name of the place must be authentic. In indicating the velocity of water, surface areas and other similar details the plan adopted by the third and sixth parties is to be followed.

(4).—All maps should bear the name of the district clearly shown in head lines. Cross cut lines are to be marked in red with alphabetical indications in blue. Maps illustrating special points should be drawn on separate sheets and named in accordance with the principal map. In such maps the necessary marks for purposes of reference should be shown.

(5).—Stone monuments, stone piers and similar erections are to be taken as fixed points and measurements may be marked thereon with records as to the date and the number of the surveying party for permanent reference. Bench marks are of great importance but an examination of the maps prepared by survey parties already in the field show that they have not invariably been accurately recorded. In order to secure a larger measure of accuracy it is now decided that the number of survey points shall be considerably increased and that the extent of the survey shall be 1,000 metres from the banks, but all such natural objects as ponds, mounds and the like are not necessarily to be utilized.

(6).—With regard to the velocity of currents, both at the mouth of streams and in their channels, accuracy is of the highest importance. Such data form the basis of decisions concerning the deepening and the widening of the streams. Rivers receiving affluents should have their velocity measured and recorded at every confluence.

(7).—Any flood marks that may be found on trees, walls, etc., are to be noted and a record of their height taken; and if they are such as can be shown on the map they should be duly marked thereon.

* * *

XIV.—DETAILS OF PARTIES.

FIRST BATCH.

The following details were prepared by Mr. Yuan Chentzen (袁承曾), Superintendent of Survey.

The survey parties will be appointed to the different survey lines in accordance with the following arrangements:—

The First Party will begin its work from Hsipa and proceed along the Old Yellow River, passing through Yunfungkwan (永豐關), Yuchiachwang (佘家莊), Antung, Chiaolingtzen (芰陵鎮) as far as Tungyin (童營), a distance of 100 *li*.

The Second and Ninth Parties are to start together from Tatungkou, passing through Changkung (張工), Patao (八套) Yuchiatan (佘家灘), Erhmulu (二木樓), Hulutao (葫蘆套), Lohungtze (六洪子) to the sea, a distance of 140 *li*.

The Third Party is to start from Matutzen, along the Grand Canal through Songkingcha (雙金閘), Erhpu (二鋪), Sanyipa (三益埧), Chunghsin (衆興), and Yanghwashih (仰花集), as far as Liulaokien (劉老澗), a distance of about 120 li; and this party will then continue from Liulaokien, through Chenwumiaoshan (眞武廟山), and Loma Hu (駱馬湖), to Lochiayin (陸家營), a distance of about 100 *li*.

The Fourth Party will commence its work at Tungyin, passing through Shimatu (施馬頭), Kaochiachwang (高家莊), Peishatzen (北沙鎮) as far as Tatungkou (大通口) a distance of 90 *li*.

The Fifth Party will survey the Hungtze Hu and its immediate surroundings.

The Sixth Party will start from Matutzen (馬頭鎮), along the Changfo Ho, passing through Chenshih (陳集), Shunhoshih (順河集), as far as Hukou (湖口), a distance of about 50 *li*; then this party will start again from Chenshih, along the Tienren Ho (天然河), passing through Hsiaowongshih (小王集), and Chenchang (鄭場) to Hukou, a distance of 25 *li*; and the survey will be continued from Yenhotsai along the Yen Ho, passing through Hsipa and Yunfungkwan, to Antung, a distance of about 80 *li*.

The Seventh Party is to commence its work at Hsipa, proceeding along the Old Yellow River and passing through Wuchenchipao (吳城七堡), Changchwang (張莊), Chenchwang (陳莊), to Taoyuen, a distance of about 80 *li*; at this point the party will start again from Chenchwang, Southwest of Taoyuen, passing through Puchia Hu (卜家湖) to the Hungtze Lake, a distance of about 25 *li*.

The Eighth Party will take the survey of the Hungtze Hu and determine both the area and the depth from Yuyikou (盱眙口), to Fushanshih (浮山集).

The Tenth Party will commence its work from Taoyuen, passing through Hsinhushih (新河集). Chenyu (鄭圩), Kuchenshan, (古城山), and Yangho (洋河) to Sutsien, a distance of about 90 *li*.

ADDITIONS AND ALTERATIONS.

The following additions and alterations are made in the apportionment of the above work:—

The First Party, after completing the original plan is to continue its work from Wuchangpa (武障垻), to Hsinpu (新浦), and Haikou (海口), a distance of 120 *li*.

The Sixth Party, after the completion of its original plan, is to continue its work from Antung to Wuchangpa, a distance of 80 *li*.

The Tenth Party is to take the survey of Kweijente instead of the lines originally decided upon.

Note:—Kweijente was originally included in a second part of the survey. As there is a local dispute over the right to the exclusive use of the waterways of Kweijente, the Bureau has been asked to help to decide the matter and the Tenth Party has been appointed to this task.

The Seventh Party, after completing the survey of the Old Yellow River is to survey another line from Sutsien to Taoyuen, a distance of 90 *li*.

SECOND BATCH.

The First Party is to start from five points: (*a*) from Tingchiachu (丁家嘴), along the Lotang Ho. through Tahsinshich, Loma Hu, Chouchiakou (周家口), Lokou (盧口), and other places to the boundary of Shantung; (*b*) from Chouchiakou, along the main stream of the Yi, to Liulaokien; (*c*) from Lokou, through Pichou, to Hsutangkou (徐唐口); (*d*) from Lokou, through West Pichow to Shachiakou (沙家口); (*e*) from Tahsinshih along the Shachian Ho (砂僵河), to Shitzechiao (十字橋), south of Shuyang; in all about 400 *li*.

The Second Party will start from Hsutangkou, passing through Yangshan (羊山), Kingshanchiao (荆山橋), and other places to Yenchiamatu (嚴家馬頭), a distance of about 160 *li*.

The Third Party is to start from Yaowan, pass through Hsutangkou, Hwanglingchwang (黃林莊), and the boundary of Shantung to Hsiatzen (夏鎮), a distance of about 250 *li*.

The Second and Third Parties shall jointly undertake the survey of the Weishan Ho, a distance of about 300 *li*.

The Fourth Party will start from four centres: (*a*) from Antung along the Mingpi Ho, through Yangchikan (楊棋杆), to Tien Hu (甸湖); (*b*) from Yangchikan along the Yifan Ho (一帆河), towards the Tsao Ho (潮河), through Hsiangshuikou, (响水口), to Kwanhokou (灌河口); (*c*) from Hsiangshuikou eastward along the Wuchang Ho, to Tamiaotze (大廟子), to the point reached by the Ninth Party in the previous batch; (*d*) along the Luenkou Ho (龍溝河), to the Yen Ho to the point reached by the First Party of the first batch; a total distance of about 300 *li*.

The Fifth Party will continue the survey of the Hungtze Hu both as regards levels and bench marks.

The Sixth Party will start from: (*a*) Liulaokien, along the Lotang Ho, through Chienshih (錢集), Tangkou (湯溝), and other places to the mouth of the north Lotang Ho, as far as the point reached by the First Party of the previous batch; (*b*) from Chienshih along the South Lotang Ho, to the point near its mouth reached by the First Party of the last batch; and (*c*) from Tangkou, along the Shu Ho to Shitzechiao; a total distance of 350 *li*.

The Seventh Party will start from Weichicha, pass along the Grand Canal, through Chin Ho, Hwaian and other places to Chiashu (界首), a distance of about 150 *li*.

The Eighth Party will continue the survey of the Hungtze Hu, especially with regard to soundings and triangulation.

The Ninth Party will start from Kwaochouku (瓜洲口), pass along the Grand Canal, through Yangchow, Shaopei, Kaoyu and other places down to Chiashu, a distance of about 160 *li*. The work of surveying the Kaoyu, Paoyin and other lakes will be undertaken by the Seventh and Ninth Parties, covering a distance in all of over 600 *li*. As these lakes are of great importance for the Hwai and the Grand Canal, the work of surveying them is allocated to the senior party.

The Tenth Party is to undertake: firstly, the examination of the bench marks along Kweijente, and the reconaissance of the survey line to Tahwatze (大窪子). With a view to settling the dispute between Taoyuen and Sutsien we have been officially requested to make investigations, and consequently the Bureau is responsible for this matter, for the solution of which it is necessary to secure land levels and to determine through what channels the Kweijen Ho shall be allowed free passage. The matter is one of great importance and requires the utmost care. The places previously surveyed should be resurveyed and any inaccuracies corrected, the survey being at the same time completed. Secondly, the party will continue its survey of the following lines: (*a*) from Hsuyu (徐圩), through Hanshuiyu (韓水圩), Shangfang (上房), and other places to Haichow; (*b*) from Taiyu 載圩), through Kwantienyu (官田圩), to Hanshan (韓山); (*c*) the Hsuhan Hu, (碩項湖), the Chinyi Hu (青伊湖), and other lakes; (*d*) from Shihtzechiao (十字橋), west Shuyang (沭陽縣), to the Chinyi Hu; (*e*) from the Chinvi Hu through Luenerhwang (龍兒莊), Shaotienyu (邵店圩), and other places to the boundary of Shantung; a total distance of 390 *li*.

XV.—FIRST SURVEY REPORT.

The following report on the results achieved by the First Batch of survey parties in the third year of Hsuan-tung has been prepared by Messrs. Fan Chi-hsien (范起賢), Tang Li-chen (談禮成), and Shen Ping-wong (沈秉璜), Overseers of Survey; and has been approved by Sa Yuen-ping (沙元炳), Resident Director, and Yuan Chen-tzen (袁承曾), Superintendent of Survey.

FIRST PARTY.

Names of Members.

Tang Li-chen (談禮成), Officer-in-Charge and Overseer.
Tang Fo-chen (談福成), Surveyor.
Shi Yin-yung (石應熊), Surveyor.
Tai Shen-sung (戴盛淞), Assistant Surveyor.

Period of Work.

From the 1st day of the 3rd. Moon to the 10th day of the 6th Moon of the Third Year of Hsuan-tung, *i.e.*, 98 days.

Days in the Field.—46.

Accessory Work.

4 days testing instruments, 7 days map-making, 6 days special work, 4 days recording Bench Marks, 17 days rainy weather, 14 days travelling, *i.e.*, 52 days.

Rivers and Lakes surveyed.

The Yen Ho from Wuchangpa (武障垻) to Hsinpukou (新浦口), a distance of 123 *li*: and the Old Yellow River from Hsipa (西垻) to fungyin (童營), a distance of 105.85 *li*.

Length of Survey Line traversed.—646.25 *li*.

SECOND PARTY.

Names of Members.

Liu Jui-ling (劉汝麟), Officer-in-Charge and Overseer.
Fan Chi-chi (范起傑), Surveyor.
Tsao Chen (曹澂). Surveyor.
Shen Hsien-ken (沈顯根) Assistant Surveyor.

Period of Work.—Same as for First Party.

Day in the Field.—29.

Accessory Work.

2 days testing instruments, 5 days map-making, 20 days special work, 21 days travelling, 21 days rain, *i.e*,, 69.

Rivers and Lakes surveyed.

Old Yellow River at Luenwongmiao (龍王廟), Patan (八灘), Chitao (七套), Sanpa (三垻), a distance of 68.5 *li*; and the Taiping Ho (太平河) from Lotao (六套) to the mouth of Yinyang Ho (引洋河), a distance of 61.367 *li*.

Third Party.

Names of Members.

Shen Pin-wong (沈秉璜), Officer-in-Charge and Overseer.
Chen Ping-shun (陳秉璇), Surveyor.
Jen Yung-yu (任永玉), Surveyor.
Chou Yin-yu (周應虞), Assistant Surveyor.

Period of Work.—Same as First Party.
Days in the Field.—58
Accessory Work.

2 days recording Bench Marks, 2 days testing instruments, 12 days travelling, 5 days special work, and 19 days rainy weather i.e., 40 days.

Rivers and Lakes surveyed.

The Grand Canal from Weihocha (惠濟閘), to Yaowan (姚灣) 219.4 li; and the Yen Ho from Songkingcha (雙金閘), to Yenhocha (鹽河閘), 9 li; and the Yi Ho from Yaowan to Wongchiapei (王家碑), 10 li.

Length of Survey Line traversed.—515.5 *li*.

Fourth Party.

Names of Members.

Chien Fu-fun (錢復芬), Officer-in-Charge and Overseer.
Sung Tze-hsiu (宋自修), Surveyor.
Tsung Shun (叢壎), Surveyor.
Sun Chia-chu (孫家疇), Assistant Surveyor.

Period of Work.—Same as First Party.
Days in the Field.—31
Accessory Work.

2 days recording Bench Marks, 4 days testing instruments, 18 days travelling, 17 days special work, and 26 days rainy weather, i.e., 67 days.

Rivers and Lakes Surveyed.

The Old Yellow River from Tatungkou (大通口), to Tungyin (童營), 80.937 li; and the Makong Ho (馬港河), from Tatungkou to Hsiangshuikou (响水口), 45 li.

Length of Survey Line traversed—399.61 *li*.

Fifth Party.

Names of Members.

Feng Teh-shun (馮德勛), Officer-in-Charge and Overseer.

Yu Su-chun (于樹椿), Surveyor.
Ma Chuan (馬銓), Surveyor.
Ling Tuan-ming (淩端銘), Assistant Surveyor.

Period of Work.—Same as First Party.
Days in the Field.—62.
Accessory Work.

1 day testing instruments, 2 days travelling, 4 days map-making, 6 days special work, 23 days rainy weather *i. e.*, 36 days.

Rivers and Lakes surveyed.

The Changfo Ho (張福河), from Hupien (湖邊), to Shiherhpu (十二埠), 4.4 *li*; the Tungshuite (東水堤), 14 *li*; Sanhonan (三河南), 11.73 *li*; the San Ho (三河), 10.872 *li*; the Tung Ho (東河), from Chanpa (蔣壩), to Hukou (湖口), 17.162 *li*; the Tu Ho (頭河), 4.57 *li*; and Sze Ho (四河), 3.852 *li*.

Length of Survey Line traversed.—427.976 *li*.

SIXTH PARTY.

Names of Members.

Yen Na-chao (嚴迺釗), Officer-in-Charge and Overseer,
Liu Tsing-kiang (劉清江), Surveyor.
Sung Chun-kan (宋春綱), Surveyor.
Sun Hung-yen (孫鴻年), Assistant Surveyor.

Period of Work.—Same as First Party.
Days in the Field.—52.
Accessory Work.

2 days recording Bench Marks, 2 days testing instruments, 8 days travelling, 2 days map-making, 12 days special work, 20 days rainy weather *i.e.*, 46 days.

Rivers and Lakes surveyed.

The Changfo Ho from Weichicha (惠濟閘), to Laotutu (老堆頭), 38.4 *li*; the Grand Canal from Weichicha to the Yen Ho 18.2 li; and the Yen Ho, from Yenhocha to Wuchangpa, 17.1 li;

Length of Survey Line traversed.—534.2 *li*.

SEVENTH PARTY.

Names of Members.

Tsung Yuen-chang (叢遠昌), Officer-in-Charge and Overseer.
Kih Teh-hsin (季德馨), Surveyor.
Wu Pao-yuan (吳葆元), Surveyor.
Tsung Yu-fo (叢玉孚), Assistant Surveyor.

Period of Work.—Same as First Party.

Days in the Field.—71

Accessory Work.

2 days recording Bench Marks, 1 day testing instruments, 3 days travelling, 1 day map-making, 5 days special work, 15 days rainy weather i. e., 27 days.

Rivers and Lakes surveyed.

The Old Yellow River from Yangchwang to Sutsien, 166.65 li; the Chentze Ho from Chenpatu (正埧頭), to the boundary of the Hungtze Hu, 20.84 *li.*

Length of Survey Line traversed.—700.45 *li.*

EIGHTH PARTY.

Names of Members.

Chiu Tong-shan (鞠同善), Officer-in-Charge and Overseer.
Chen Chih (陳楫), Surveyor.
Chang Hse (張豨). Surveyor.
Ma Kien-chin (馬鑑清), Assistant Surveyor.

Period of Work.—Same as First Party.

Days in the Field.—64.

Accessory Work.

3 days recording Bench Marks, 1 day testing instruments, 4 days travelling, 6 days making calculations, 3 days special work, 17 days rainy weather, i. e., 34 days.

Rivers and Lakes surveyed.

Trangulation and soundings of Hungtze Hu.

Length of Survey Line traversed.—531.52 *li.*

NINTH PARTY.

Names of Members.

Feng Ki-lung (馮際隆), Officer-in-Charge and Overseer.
Tao Tzen-tsung (陶振宗), Surveyor.
Li Pan-hwa (李邦槐). Surveyor.
Sun Pei-Tsong (孫伯蒼) Assistant Surveyor.

Period of Work.—Same as First Party.

Days in the Field.—38 days.

Accessory Work.

2 days testing instruments, 18 days travelling, 1 day map-making, 13 days special work, 26 days rainy weather, i.e., 60 days.

Rivers and Lakes surveyed.

The Old Yellow River at Tayukien (大淤尖), Hsiaoshih (小集), and Kunshih (龔集), 59.6 *li*; the Wuchang Ho (武障河), from Wuchangpa to Tamiao(大廟) 13 *li.*

Length of Survey Line traversed.—314. 64 *li.*

TENTH PARTY.

Names of Members.

Wong Tze-tzen (王 子 尊), Officer-in-Charge and Overseer.

Lo Ming-chung (羅 銘 鍾), Surveyor.
Chen Kin-ming (程 敬 銘), Surveyor.
Chen Ta-yih (陳 達 義), Assistant Surveyor.

Period of Work.—Same as First Party.

Days in the Field.—44

Accessory Work.

3 days recording Bench Marks, 1 day testing instruments, 16 days travelling, 9 days map-making, 4 days special work, 21 days rainy weather, i.e., 54 days.

Rivers and Lakes surveyed.

The Old Yellow River from Hsipa to Yangchwang, 9.5 li; the Mingpi Ho from Sankunchiao (三 孔 橋), to Kweijencha, (歸 仁 閘), 33.26 *li*; the An Ho (安 河), from Anjencha (安 仁 閘), to Lolotan (螺 螺 灘), 46.4 *li*; Tungchiakou (董 家 溝), from Kweijencha to Munchiawan (孟 家 灣), 14.76 *li*; the Lochia Ho (羅 家 河), from Kweijencha to Hsipa (新 堪), 18.1 *li*; the Kweijen Ho together with Kweijencha, and from the Shu Ho (睢 河) to Szeshih (四 集), 45.44 *li*; the Paochia Ho (鮑 家 河), from Szepu (四 埠), to Chenchianan (陳 家 南), 25.9 *li*; and the Changchao Ho (張 稿 河), from Sanpu (三 埠), to Changchaochiao (張 碻 橋).

NOTES ON ABOVE REPORT.

(*a*). In reckoning the number of *li* surveyed, the plan, in the case of large and broad streams, is to take the average of the survey lines on the two banks of the river. By this method of reckoning the ten parties have surveyed 1,710.496 *li*.

For instance, the survey of the Old Yellow River from Sutsien eastward down to the mouth of the sea actually amounts to 491.17 *li*; that of the Yen Ho from Sonkingcha to Hsinpu and Haikou actually amounts to 303 *li*; and that of the Grand Canal from Weichicha to Yaowan actually amounts to 237.6 *li*. With regard to the other rivers, the number of *li* surveyed is shewn in the previous table.

(*b*). The number of *li* is reckoned according to the actual length of the river so as to form a basis for future work. In noting down the results achieved by the different parties the number of *li* is reckoned according to the survey line: thus, the distance between the two banks of the Old Yellow River varies from several *li* to twenty *li*, and it is necessary for the work to advance in three directions; and whilst the course of the river forms only one line of a definite length the survey line really amounts to three times that length. Again, the sections across the Old Yellow River vary from several *li* to twenty *li*, and by adding these several sectional lines together the total length of survey is equal to that of a very large river. As to other rivers, the survey is taken on both sides of the river and cannot be calculated according to river lengths, but must be reckoned according to survey lines. In counting the number of *li* of the survey lines, in the case of the Old Yellow River the survey line is to be estimated at three times the sectional lines; in the case of other rivers the survey line is to be counted as twice the sectional lines; and for the Hungtze Hu the actual length of the curves through the bench marks is to be reckoned.

(*c*). The Eighth Party undertakes the triangulation of the Hungtze Hu and its soundings, whilst the Fifth Party undertakes the survey of the river and the topographical details.

(*d*). During the rainy season, parties who have no result to show for any special day are to count that day as a rainy day, but if any result at all can be achieved the day is to be reckoned as a working day. Differences in the weather cause differences in the work accomplished at different places on the same day, and these differences are shown in the separate report of each party.

(*c*). The surveying work on the Old Yellow River from Tatungkou (大通口) downwards is to be taken alternately by Second and Ninth Parties; and this is indicated in the preceding statement by the particular mention that is made regarding the names of the maps of each section, such as Luenwongmiao, Patan, Chitao, etc.,